

THE IRON AGE

New York, March 21, 1929

ESTABLISHED 1855

VOL. 123, No. 12

High-Strength Structural Steels

Low-Manganese Steel, in the As-Rolled Condition, Possesses High Proportional Limit and Impact Strength, and is Used for Boilers, Bridges, Structures and Ships

BY E. E. THUM

IT will be recalled that the first attempts to make steel in a Bessemer converter from English ores failed because the blown metal was wild in the ingot, and could not be rolled. Swedish pig iron, used as raw material, was immune from these troubles; Robert Mushet found that the difference was due to manganese, and proposed adding a high manganese pig iron to blown metal to quiet it, a scheme which saved the new process, then quite discredited in England.

Later investigations showed that this added manganese has a stronger chemical affinity for oxygen and sulphur than iron, and consequently its presence in Bessemer or open-hearth steel to at least 0.30 per cent is necessary for removing these elements or locating them so as to be much less obnoxious to the finished metal. Since high manganese alloys were expensive, the steel maker attempted to use only a slight excess of this "medicine." For this reason low carbon plates, shapes and bars will seldom analyze more than 0.6 per cent manganese.

It is surprising that the full possibilities of this useful addition element were not explored at an early date. Blister steel (cemented wrought iron) is merely iron and carbon, without silicon or manganese. It made excellent cutlery, but cannot be hardened without cracking in masses much thicker than a blade. Some manganese is necessary for hardening uniformly. Manganese in a fractional per cent was also known to improve the rolling and forging properties of Bessemer steel, but it became noised about that too much caused brittle ingots. High carbon steels for edged tools also tended to crack during water quenching if the manganese got above 0.25 or 0.35 per cent. (Fortunately, since steels containing 1 per cent or more of carbon are usually made in the crucible or electric furnace, and are deoxidized in the process, manganese is not required for quieting.) Despite the admitted neces-

PERTINENT information is contained in this article on steel for the following purposes:

Steel rails

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Long span bridges

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High-strength structural steel

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Ship plate and beams

* * *

High pressure boilers

* * *

Compressed gas cylinders

sity of homœopathic doses, it was generally understood that manganese should be sharply limited in quantity, else the steel would be brittle; this belief persists in many quarters to this day.

In the last century it was fortified by researches at the Terre Noire Works in France, where it was found that 0.45 to 0.60-carbon steels containing more than 2.5 per cent manganese were too brittle to work, and also that even lower manganese steels cracked during quenching in water. Facilities for making low carbon high manganese alloys were lacking, and there was apparently no demand for such compositions as could be made. Sir Robert Hadfield, in the discovery of the high manganese austenitic steel that bears his name, also found

brittle metal in medium carbon alloys containing from 3 to 7 per cent manganese.

Despite these handicaps, considerable tonnages of strong structural steels, either for use in as-rolled or normalized conditions have been made since 1915; higher manganese alloys, for use after an oil-quench and draw, are also being marketed in increasing tonnages in America since 1924 in competition with other low alloy steels.

An indication of the undeserved reputation which still exists in some quarters is found in the recent specification for railroad castings which limits manganese to a maximum of 0.85 per cent. Makers of low alloy steels are also prone to give credit to a minor content of other elements for the excellent properties primarily due to an excess of manganese.

A glance at the diagram on page 799 shows that in American practice nearly all the tonnage steels now contain more than the 0.30 per cent manganese necessary for soundness, and the medium and hard grades are essentially alloys of iron, carbon and manganese. Basic open-hearth steels would ordinarily have somewhat lower manganese than

Table I—Upper Limits for 100-Lb. Rails, 1912

	New York Central Lines	Pennsylvania Railroad	American Railroad Engineering Association
Bessemer Steel			
Carbon	0.70	0.55	0.55
Phosphorus	0.10	0.10	0.10
Manganese	0.70	1.20	1.10
Open-Hearth Steel			
Carbon	0.75	0.75	0.76
Phosphorus	0.04	0.04	0.04
Manganese	1.00	0.80	0.90

acid open-hearth steels of the same carbon content, and, as will be shown later, Bessemer steels would have more than indicated by the cross-hatched band in the diagram.

Manganese in Rail Steels

AN instance of how a carbon steel becomes a low manganese alloy steel may be cited from the history of railroad rails. The first sizable consumption of Bessemer steel was by railroads, and demand for a rail with harder wearing surface and stronger body grew with the increasing wheel loads. Bessemer steel was recarburized with spiegel iron and each increase in carbon meant correspondingly higher manganese.

Manganese thus arrived in the rail specification through no recognized virtue of its own; in fact, most railroad men when they thought about it were nervous over its "embrittling" nature, but it hung on the coat tails of the carbon, so to speak. Thus the Carnegie specification for 90 to 100-lb. Bessemer rails in 1899 was carbon 0.45 to 0.55 per cent, manganese 0.80 to 1.10, phosphorus 0.10 max. In 1912 the Pennsylvania Railroad specified the same chemistry, but raised the maximum limits of manganese to 1.20 per cent. During these years the railroad men became convinced that phosphorus was the real embrittling element, and began to demand open-hearth steel for heavy rails. More carbon was added to replace the hardening effect of the missing phosphorus, but there seemed to be some doubt about what to do with the manganese, as indicated in the comparative specifications in Table I.

It is thus apparent that when the open-hearth rail supplanted the Bessemer in America, manganese remained high, despite the fact that the carbon could be added in various ways without largely increasing the manganese content. More recent trends are shown by the following 1927 American Society for Testing Materials' specifications:

	60-Lb. Sections	85-Lb. Sections	120 to 140 Lb. Sections
Carbon	0.50 to 0.63	0.62 to 0.77	0.72 to 0.89
Manganese	0.6 to 0.9	0.6 to 0.9	0.5 to 0.9
Silicon	more than 0.15	more than 0.15	more than 0.15

Manganese is added as ferromanganese to the ladle. Opinion is favoring higher residual silicons—0.20 per cent

Table III—English High Strength Ship Steels

	Mild Steel for Ship Plates	D-Quality for Navy	Holt & Co. Commercial Vessels
Specifications:			
Ultimate strength	63,000 to 74,000	83,000 to 96,000	65,000 to 76,000
Yield point	.....	56,000*	.....
Proportional limit	18,000*	Min. 38,000†	Min. 34,000
Elongation in 8 in.	20	17	.....

*Not specified; this is an average value.

†Average value is 45,000 lb. per sq. in.

or more, enough to act as an effective gas solvent and to quiet the metal in the ingot mold. Such a sounder piping steel segregates less than when it partially effervesces, and segregated metal is found in most rails broken under traffic, and thus is more to be feared than an undiscovered remnant of the pipe.

The figure shows plainly how the open-hearth rails rolled today are lower in manganese than the Bessemer rails rolled prior to 1910. It also shows the chemical relationships of much higher manganese rails first used by the Lackawanna Railroad. Experience with about 250,000 tons of rails containing carbon 0.55 to 0.65 and manganese 1.3 to 1.5 per cent, shows them to have superior strength and wearing properties, lasting up to twice as long as the conventional analyses under heavy traffic. Early experiments with increased manganese in rails were disappointing; the steels were not especially durable and were prone to develop "transverse fissures." Such troubles have been avoided since 1920 by proper balance of carbon, manganese and silicon, however, and an increasing amount is being rolled each year. They should not be confused with the austenitic manganese steel rails containing 10 to 15 per cent manganese, frequently used for sharp curves, switch rails and crossings.

Strong Structural Steels

THE above paragraphs outline the manner in which open-hearth rail practice has developed along somewhat the same directions that have produced the high strength

Table II—American High Strength Structural Steels

	Metropolis Bridge Ohio River (Modjeski, 1915)	Richmond Power Station Philadelphia 1926	Philadelphia- Camden Bridge 1923	Carbon Structural Steel A.S.T.M. Standard
Physical properties	Specified	Actual	Specified	
Ultimate strength.....	80,000-95,000	81,000-93,000	80,000-95,000	55,000-65,000
Yield point.....	Min. 45,000	47,000-53,000	Min. 45,000	Min. 30,000
Reduction in area.....	Min. 35	46-36	Min. 35	
Elongation.....	Min. 17	24-18	20-17	Min. 22
Chemical analysis		Average	Actual	Approximate
Carbon		0.35	Max. 0.44	0.15-0.30
Silicon		0.27	0.18-0.44	{ basic less than 0.03
Manganese		0.76	Max. 1.10	0.40 to 0.70

structural steels (often called in America "structural silicon steels")—at least to the extent that they both carry 0.20 to 0.30 silicon, a definite excess which makes for killed unsegregated steel, piped deep enough to require big-end-up ingots with hot tops or a discard up to 25 per cent. Strength is given to the rail by high carbon and moderate manganese; the two are reversed in importance in the high strength structural materials.

As shown in Table II the silicon content is ordinarily so small that the name "silicon steel" is a misnomer. True enough silicon is a strengthener, as is manganese, and British and German engineers have used strong structural steels with approximately 1 per cent silicon. Whether carbon, manganese, silicon, nickel or some other alloy is used for the required strength in structural steel for long bridges will depend upon surrounding conditions. In general it would be proper to get the increased strength by carbon, as long as the hardness is not increased beyond the limit of the fabricating tools, and as long as high impact strengths are not required. The lower carbon alloy steels (like nickel steel) are better where temperature at the finishing pass and the speed of cooling can be controlled, or where an actual normalizing heat treatment can be given. Of the alloys, silicon and manganese are much cheaper than nickel; which of the two former would be used in low alloy structural steels would probably depend upon metallurgical convenience and the cost of adding the two ferros. High silicon steels could more readily be produced in acid than in basic open-hearth furnaces.

American engineers prefer higher carbon and lower manganese than do the English constructors. Our chem-

ical limits would run carbon 0.30 to 0.45, silicon 0.15 to 0.45 and manganese 0.70 to 1.10 per cent. Such steel can be depended upon to carry 40 per cent greater load than carbon structural steel, it stands all the bending and drifting tests given the latter, and since it costs one cent or less per pound premium it is economical to use in large bridges where dead-weight must be saved, in towers where high elastic limits are required, or in large structures where size and clearances are determining considerations. It is reported that the use of 8000 tons of high strength steel in the 10,000-ton framework of the Richmond power station (Philadelphia) gave better column clearances at boilers and aisles, and lower heights, since smaller beams could be used or rolled shapes substituted for built-up girders. The estimated saving was \$150,000.

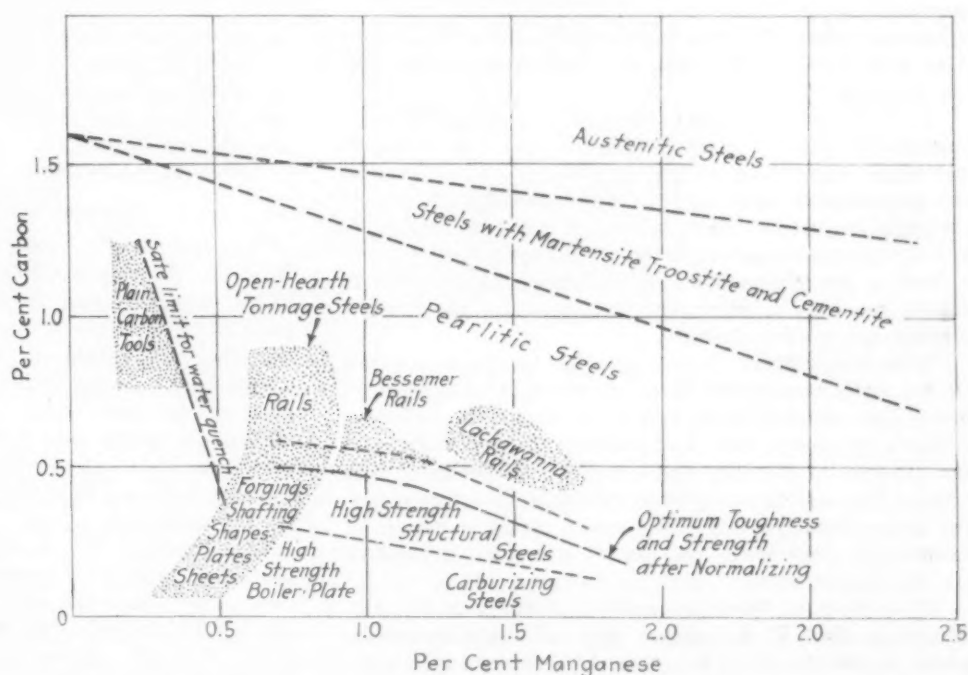
High strength structural steel for the Philadelphia-Camden bridge was made in 75 to 100-ton basic open-hearth furnaces. About seven times as much ferrosilicon was needed as for regular structural material; one-fifth was added to the furnace 40 min. before tapping as 14-per cent ferro, together with 2½ times its weight of burned lime (to protect the basic lining). The necessary

Table IV—Woolwich Arsenal Tests on Normalized Structural Plates

Analysis:	Plates of Equal Strength		Plate Rolled at Low Finishing Temperature	Plates of Equal Carbon Content		
	High Manganese	High Carbon		0.18	0.23	0.22
Carbon	0.29	0.50	.....	0.36	0.61	1.33
Manganese	1.60	0.68	.....		
Tensile properties:						
Ultimate strength	93,000	92,000	84,000	62,000	70,000	78,000
Yield point	53,000	48,500	55,000	32,000	40,000	47,000
Proportional limit	40,500	29,000	51,500	18,000	22,500	36,000
Elongation in 2 in.	31	28	29	33	35	36
Reduction in area	68	46	62	61	59	66
Fatigue limit	45,500	40,000	34,000	29,000	36,000	40,000
Izod impact	45	13	.....	73	70	86
Brinell hardness	183	186	.....	126	140	156

had previously gone on the assumption that the proportional limit of carbon steel ship plate and shapes is half the ultimate strength; when precise tests are actually made the proportional limit is found to vary widely, but the average is no more than 18,000 lb. per sq. in. Since the stresses in a ship's hull may be calculated with fair

WHILE plain carbon tool steels have a limited amount of manganese, the tonnage steels all contain 0.3 to 0.8 per cent. Material improvement in properties is gained by adding silicon, ordinarily less than 0.3 per cent, for soundness, and from 1.0 to 1.75 per cent manganese for strength



80-per cent ferromanganese was added to the furnace 6 min. before tapping, and the balance of silicon as 50-per cent ferro added in the ladle. Expert attention was necessary to arrive at the correct chemical composition and rolling temperatures, especially at the final pass, so as to get materials hard enough for the strength required, but ductile enough for the bend tests.

Yields of shapes (rolled from 5-ton top-cast ingots) were about 9/10 that of standard analyses. Plate slabs were rolled from 10-ton top-cast ingots; slabs were cooled, surface defects chipped, reheated and rolled to plate. Yields were about 80 per cent those of ordinary structural grades.

High Elastic Limit Steel for Ships

BRITISH engineers have pioneered in using high strength steel for ships. As long ago as 1907 a quantity of high silicon high manganese steel was built into the hulls of the Lusitania and Mauretania (Table V). The design did not prove so successful, however, and considerable metal was later added to decrease vibration. The more conventional materials were used until after the Washington naval conference, limiting the weight of war vessels and consequently warranting a premium for steels with uniformly high proportional limits. Ship designers

precision, and since these stresses should not cause permanent set in the frames, it follows that if a steel of uniformly high proportional limit could be produced, the actual limit of elasticity could be used for design purposes and much weight saved. Investigation proved that steel containing carbon about 0.33 per cent, silicon about 0.12 per cent and manganese 1.1 to 1.4 (known as "D" quality) can be produced with a minimum proportional limit of 38,000 lb. per sq. in., and an average of 45,000. Its properties as compared to the ordinary British mild steel are shown in Table III. All portions of the hull contributing to the girder strength of British warships built in the last eight years have used "D-steel," and

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Chemical analysis:	"F" or Freund Steels			Steel Used in Mauretania
	0.15	0.17	0.13	
Carbon	1.10	0.9	0.9 to 1.25	1.12
Silicon	1.00	1.0	0.4 to 0.8	0.72
Manganese				
Tensile properties:				
Ultimate strength	79,000	78,000	76,000	92,000-105,000
Yield point	59,000	56,000	56,000	65,000
Elastic limit	24.5	24	24	25-30
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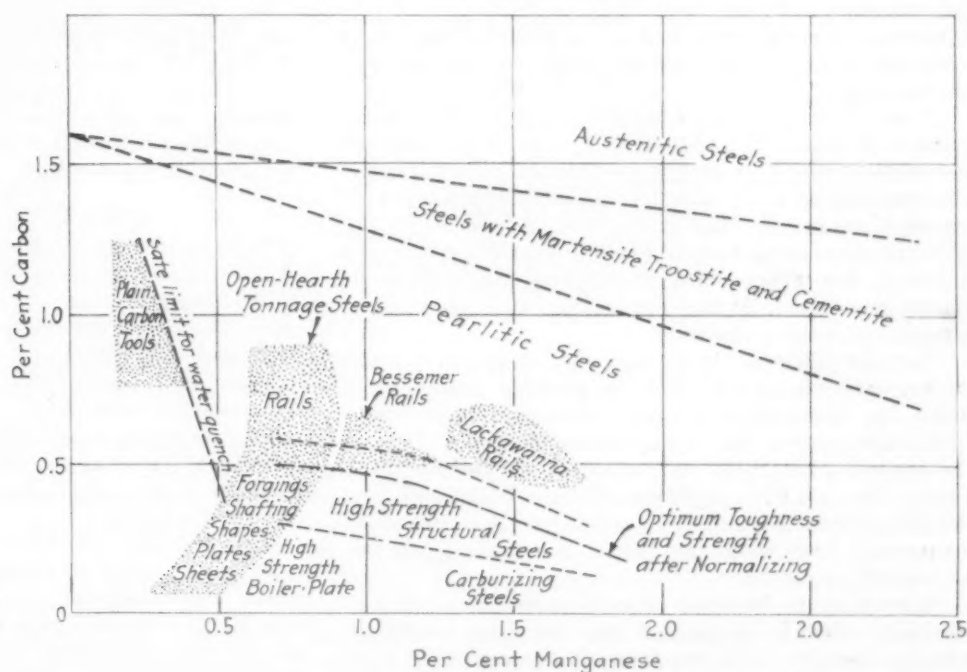
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Yield point	59,000	56,000	56,000	65,000
Elastic limit	59,000	56,000	56,000	65,000
Elongation in 8 in.	24.5	24	24	25-30
Izod impact	58-86*

no defects have developed in service. Half of the steel in the hulls of commercial vessels recently built for Holt & Co. have been a material similar to "D-steel"; a saving in dead weight of 10 to 14 per cent is reported.

D-quality steel is made of selected scrap, and cast in big-end-up molds with hot tops to feed the shrinkage cavity. Temperature and time of soaking is under control. Temperature at the final pass in the rolling mill is 1550 to 1620 deg. Fahr., rather above the critical range. Hot-bed cooling will then be equivalent to a normalizing treatment (i.e. heated to 1560 deg. Fahr. and cooled in still air). Routine test for proportional limit is made by setting a Ewing extensometer at zero when the load is 4500 lb. per sq. in. The load is increased gradually to 38,000 lb. per sq. in., and then reduced to 4500. Permanent extension must not exceed 0.0004 in. in 8 in. Plates must also bend 180 deg. about a pin 3 times the thickness. D-quality steel fabricates somewhat less easily than mild steel, but shop men soon become acquainted with the material.

Table IV contains data indicating its superiority. Comparison of column 1 and 2 indicates that it is better to get added strength by manganese than by carbon, because the proportional limit, ductility and especially the impact strength are better. High carbon steel is also more sensitive to normalizing temperatures; if cooled from too low a heat a low proportional limit, yield and ultimate is found; too high a normalizing temperature reduces the already low impact strength.

High proportional limits may also be given to lower carbon lower manganese steels by finishing them slightly below the transformation range. However, as column 3 of the table shows, this strengthening by cold work is at the expense of ductility and especially of fatigue properties. The last three columns of Table IV indicate how the proportional limit in low carbon steels is raised by manganese, even while the impact and ductility figures are slightly increased.

Other tests at Woolwich arsenal proved that the air-hardening effect of manganese does not cause trouble in plates if manganese is less than 1.8 per cent in a 0.20-carbon steel, or less than 1.4 per cent in a 0.35-carbon steel (the limits shown by the dotted line marked "optimum toughness and strength" in the figure). Compositions beyond this line when normalized show increasing hardness and lowered proportional limit, ductility and impact strength. The dotted line may therefore be regarded as approximately marking the beginning of air hardening in $\frac{3}{8}$ -in. plate.

German "F" or Freund Steel

In the last few years a high silicon high manganese steel has been exploited in Germany under the name of

"F" or "Freund" steel. Chemical compositions and physical tests are shown in Table V. It is seen to be quite similar (except lower in carbon) to the special steel used 20 years ago in the Mauretania; exaggerated claims of high quality and low gas content due to manufacture at high temperature in a special furnace have been made.

High Strength Boiler Plate

IN the figure an area of low carbon steels below the structural grades is occupied by high strength boiler plate and carburizing steels. The former is marketed in the United States as "silicon steel," although its ordinary chemical limits are carbon less than 0.35, silicon 0.20 to 0.30 and manganese 0.60 to 0.90. This steel is used for high pressure work, since its ultimate strength of 70,000 to 83,000 is at least 10,000 lb. per sq. in. more than can be had from commercial flange steel, and

the elastic ratio (elastic limit divided by ultimate strength) is about the same. Ductility (a minimum elongation of 22 per cent in 8 in.) is a little lower. It fabricates without difficulty, and, as compared with nickel steel boiler plate, is less subject to "snakes" and other surface irregularities produced during rolling.

Compressed Gas Cylinders

CYLINDERS for compressed gases are made of steels whose composition is along the upper boundary of "high strength structural steels" as dotted on the figure. Most of those in use in America are so low in manganese that they fall within the range of tonnage steels, but a 0.5 per cent carbon 1.25 manganese analysis has been marketed for many years. Recent trends are toward even higher manganese and lower carbons, in line with the principles stated at the first of this article, and such an analysis (0.35 C, 1.65 Mn, 0.30 Si) has won recognition for its toughness.

Gas cylinders are made from a circular plate; first operations consist of cupping by forcing through proper dies. Final diameter and length is attained in a draw bench. This gives a tube with closed bottom. After the top is trimmed square it is "necked" in swaging dies. All this work is done hot. After the required heat treatment the top is fitted with a valve. Acceptance tests are specified by the Interstate Commerce Commission as follows: Each cylinder is tested to 66 per cent overpressure and must not retain a permanent set of 10 per cent the total expansion. One cylinder in each 200 must withstand crushing to six times the wall thickness without cracking. Retest under 66 per cent overpressure is required at 5-year intervals during service. Care in manufacture and testing has resulted in a practically perfect record of safety for the million or more high pressure cylinders now in use.

Hot Gates and Risers Cut More Quickly

STEEL foundries may make substantial savings when removing risers and sink heads if this work is done with a cutting blowpipe while the casting is still hot, according to *Oxy-Acetylene Tips*. It is recommended that as soon as the castings can safely be shaken out of the mold, the excess sand should be rubbed away from the base of all the projections, and cutting operations immediately started.

The heat of the casting should be nearly enough to maintain the reactions continuously without preheating

flames, consequently oxygen and acetylene are saved. Speed is further increased because the operator on hot metal seldom "loses the cut." Finally, the semi-plastic condition of the hot casting allows it to absorb any differential stresses caused by the local heat of the cutting flame. This is especially important to high carbon and alloy steel castings, or to metal which has an undue amount of slag particles trapped in the metal. Surface cracks are sometimes found when cold metal such as last mentioned is cut with a flame.

Chrysler Engineering Department

Laboratory Tests a Large Feature—Margin of Safety
Insured by Extreme Tests to Which Experimental
Parts Are Subjected

BY C. A. MC GRODER

DESIGN-ING and testing of experimental automobiles are now so closely related that no design can be considered adequate until it has given satisfactory performance under all possible conditions of actual operation. Only a few years ago road tests were relied upon very largely to develop any latent defects in experimental cars and parts.

But under present conditions of mass production and frequent changes in design the road test would be inadequate. There always will be road tests to determine certain performance factors, but they are now only a part of the testing done on experimental cars.

Aside from the prohibitive expense of maintaining a fleet of cars to test every part perfected by the designers, or submitted by outside suppliers, the road test fails because of its lack of uniformity and accuracy. Successive tests cannot be run under exactly the same conditions and the lack of comparability of the results obtained make it impossible to determine a definite margin of safety for the various parts tested. Hence, a complete automotive engineering department must have, in addition to designing and drafting forces, ample research and testing laboratories and every facility for mechanical experiment, to fill in the gap between the drafting room and the road test department.

Such an engineering department has been organized and perfected by Chrysler Motors at its Highland Park (Mich.) plant. A little more than five years ago the first Chrysler car was designed in Newark, N. J., by a group of 35 engineers, the nucleus of the present organization. More than 900,000 Chrysler cars have been built since then.

Today the 40,000 employees, including those at the two Dodge Brothers plants, acquired some time ago, are turning out 4 cars every minute of the working day. The little engineering department of 35 men has grown into an organization of 480 highly specialized technical men representing every known branch of automotive design and research. Housed in a modern, 5-story reinforced concrete structure, 60 by 400 ft., affording 120,000 sq. ft. of floor space and equipped with every facility for carrying on the many diversified phases of engineering re-



SINCE This Airplane View Was Taken a Fifth Story Has Been Added to Engineering Building (Foreground) and a Third to Export Building (Left)

search, testing and development work, the Chrysler engineering division is now the largest engineering department, functioning as a unit, in the automotive industry.

Under this one roof are all of the chassis and body designing, drafting, building and assembling departments and electrical, chemical, metallurgical, physical-test and research labora-

tories of the third largest automotive organization in the world. Here complete experimental cars are built, after each of the component parts has been subjected to the rigorous tests provided in the various sections of the engineering building.

At any of the six Chrysler plants it is common comment that a photograph of a Chrysler plant probably will be obsolete in 30 or 60 days, because of the erection of new buildings or additions to the old ones. This was true of the Highland Park plant. Pictures of the engineering building taken soon after it was opened, July 4, 1928, showed a 4-story structure. Within three months work was commenced on the fifth floor, which was soon completed and occupied. During the same period a third story was added to the entire length of the export building, just back of the engineering building, and an entirely new 4-story building was added to the plant.

On the ground floor of the engineering building are the electrical, chemical, metallurgical and physical-test laboratories, the dynamometer room or power plant test department, the road test department and a large reception room at the main entrance. A large part of the second floor is occupied by the executive offices of the engineering division and a show room for the display of completed cars is 60 by 140 ft. On this floor also is the research laboratory, the department in which the results of developments and tests made in the other departments are recorded, analyzed and coordinated.

The mechanical laboratory, devoted to determining accurately the operating characteristics of the many moving parts that enter into the construction of an experimental car, is on the third floor. Adjoining it is a well equipped machine shop, the exclusive purpose of which is the manufacture of testing apparatus and of parts for experimental cars. Nearby, on the same floor, is the chassis

assembly department, including the power plant assembly section. A casual trip through the building thus far gives the impression that it is a mass production shop rather than an engineering division, for there is much machinery in operation and much metal being worked.

But on this floor are located also the chassis design department and the chassis drafting department. Here it becomes apparent why Smith, Hinchman & Grylls of Detroit, the architects, designed the building so long and narrow and high. The chassis design department, which is 60 by 60 ft., and the chassis drafting department, 60 by 90 ft., are daylight rooms because of the 14-ft. ceilings which prevail throughout the building.

All of the fourth floor is devoted to Chrysler bodies, about half being taken up by the body designing and body drafting departments. The other half is occupied by the body building department, except for a comparatively small room, where the experimental body painting department is located. An important section of the body designing department, on the fifth floor, is the art department.

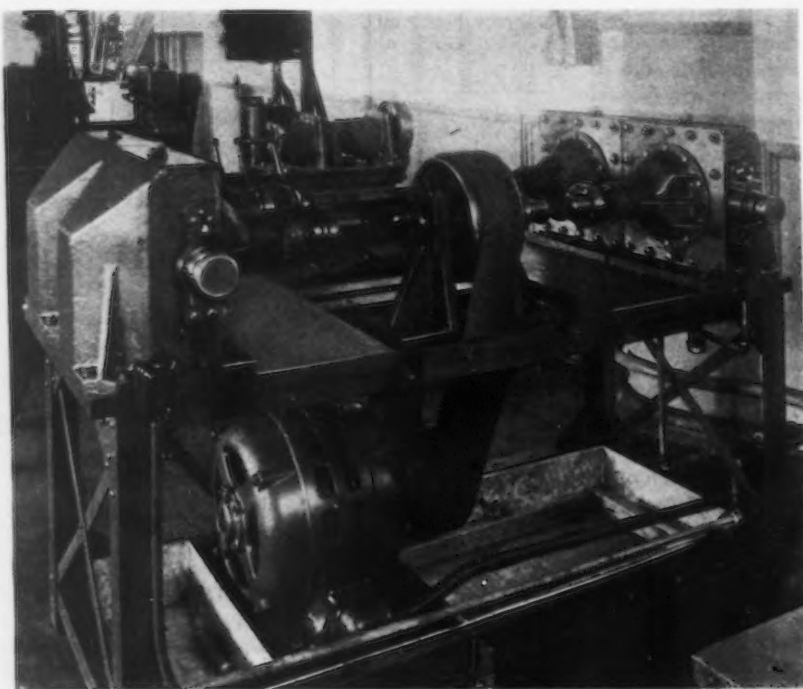
Besides assisting in determining the artistic lines of new body designs, the art department makes a study of chromatic harmony with the aid of thousands of color cards, to determine the most satisfactory color combinations. The remainder of the fifth floor is occupied by a radiator section, where radiator materials are continuously investigated, the body trim department, where the upholstery is placed in the completed experimental bodies and a large part of the research department, the rest of which is on the second floor.

While new models are being designed and their detail drawings worked out on the fifth and fourth and half of the third floors, the materials and parts which will enter into the construction of these new models are being subjected to a variety of experiments and tests on the first and half of the third floors. The mechanical labor-

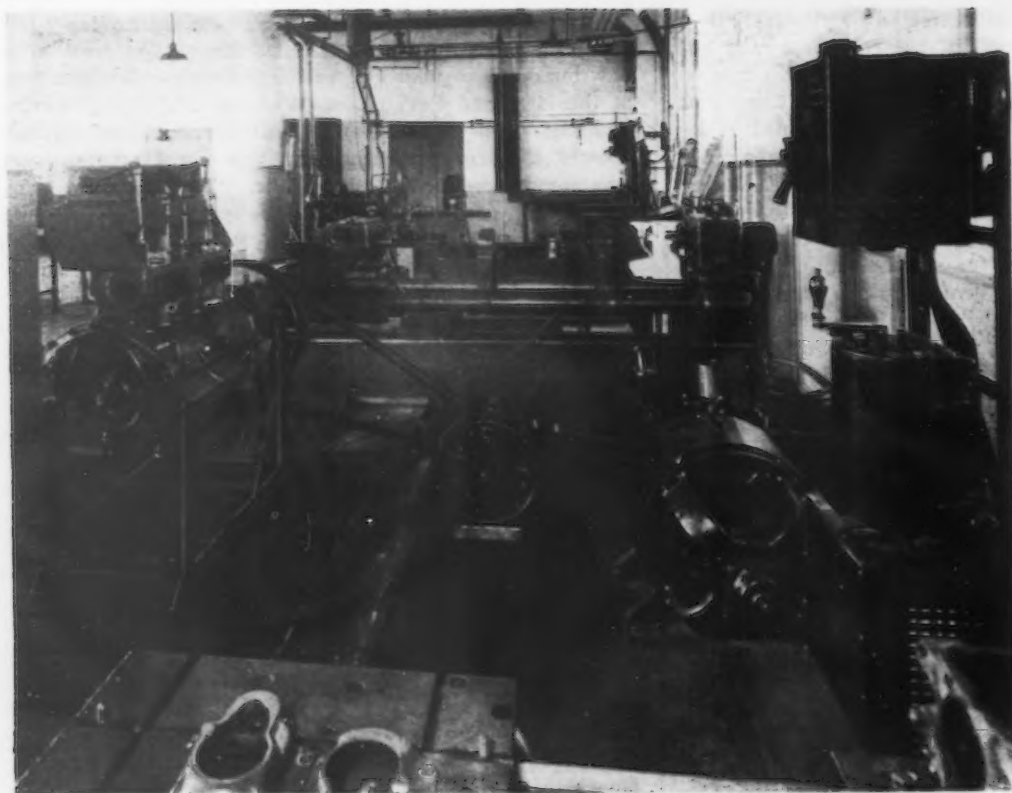
atory, which, with the machine shop and chassis assembly department, occupies half of the third floor, is filled with testing machines which definitely determine the life, endurance and operating characteristics of the various moving metal parts, aside from the engine, entering into the completed car.

Some of these machines are of standard make, as used in many industries, but most of them are Chrysler developments, designed and manufactured by the engineering division. This department plays an important part in providing moving parts with that margin of safety (usually about 30 per cent) above the performance which the finished car will be called upon to yield under road conditions.

One of these testing machines developed by Chrysler engineers is that which tests rear-axle housings, carrier



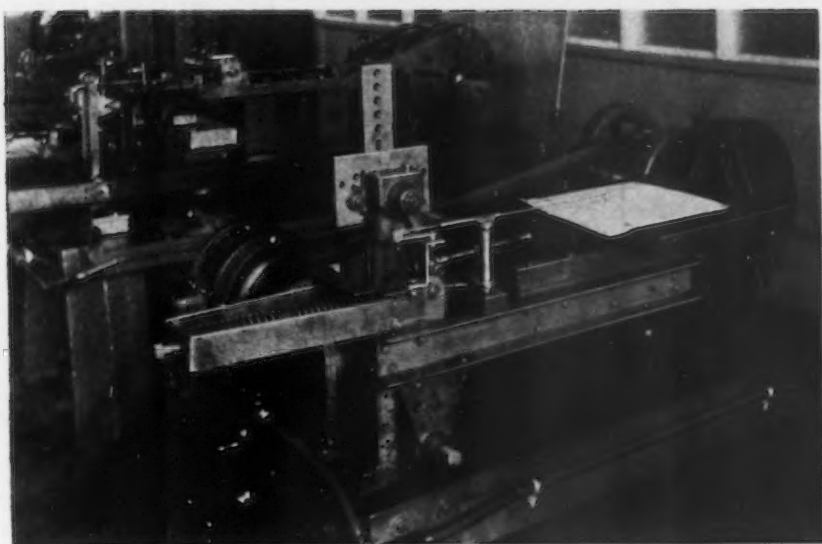
IN Machine Above, for Testing Rear Axle Carriers, Two Pairs of Carriers Are Tested at One Time



Shock Absorber Life Test Machine, Constructed of Standard Engine Parts. (Below) An ordinary engine block provides the reciprocating motion necessary to an endurance test. Usually four shock absorbers are set up to be compared; performance required is 500,000 cycles of operations, through a 5-in. stroke, at 120 strokes a minute

WELL-EQUIPPED Machine Shop on Third Floor of Chrysler Engineering Building, Adjoining the Mechanical Laboratory. This shop is devoted exclusively to manufacture of testing equipment and of parts for experimental cars

Shock Absorber Test Machine (Below) to Measure and Record Resistance in Both Tension and Compression Under Varying Conditions of Speed and Length of Stroke. Machine automatically plots resistance against stroke. Amount of back pressure developed in the shock absorber, at all points of its cycle and at varying speeds, is registered on chart by recording pencil



parts and assemblies. Two pairs of carriers can be tested at one time, permitting a direct comparison of various designs. Equally accurate comparisons can be made by testing various designs at different times by subjecting each to exactly the same number of hours' test at the same number of r.p.m., a feat impossible for the road test, as driving conditions cannot be duplicated in successive tests. The carriers to be tested are bolted to the face plates of water-jacketed housings and connected in pairs, two on each end, connected by spline shafts through the differential gears.

To obtain quick results an overload torque is supplied by slightly loosening the bolts which hold together two companion flanges on the universal joint provided to take care of possible misalignment. This overload torque is 30 per cent greater than will be available from the motors with which the carriers are to be used and, to be approved, the experimental carriers must survive a test of 200 hr. at 1000 r.p.m.

Two machines for testing shock absorbers were designed and built by the engineering division. One is a simple device in which an ordinary engine block is resorted to for the reciprocating motion essential to a life test. Four shock absorbers can be set up at once, affording a comparative test. The usual performance required for approval is 500,000 cycles of operation through a 5-in. stroke at 120 strokes a minute. This machine is used also to determine temperature rise and leakage of hydraulic devices when subjected to severe action.

Valuable as this machine is, it fails to supply data as to the resistance provided by a given shock absorber. It is impossible to acquire this information, essential as it is, through the road test, which can offer only the opinion of those who ride. So another shock absorber performance test machine was designed and built.

This second shock absorber test was designed to plot automatically the resistance against stroke. The shock absorber to be tested is bolted to a pivoted member with the arm or strap attached to the cross-head of the machine. The movement of the pivoted member is restrained by a calibrated coil spring which deflects, giving movement to a recording pencil connected through linkages to give straight-line motion.

Printed forms have been made with ordinates giving the resistance in pounds and abscissas the stroke in inches. The result of a test on this machine is practically a printed record of the resistance afforded by a shock absorber in both tension and compression under varied conditions of stroke, setting, speed and temperature. Nowhere does the laboratory test more thoroughly demonstrate its effectiveness than on this machine, which delivers performance data of an accuracy otherwise impossible.

(To be continued)

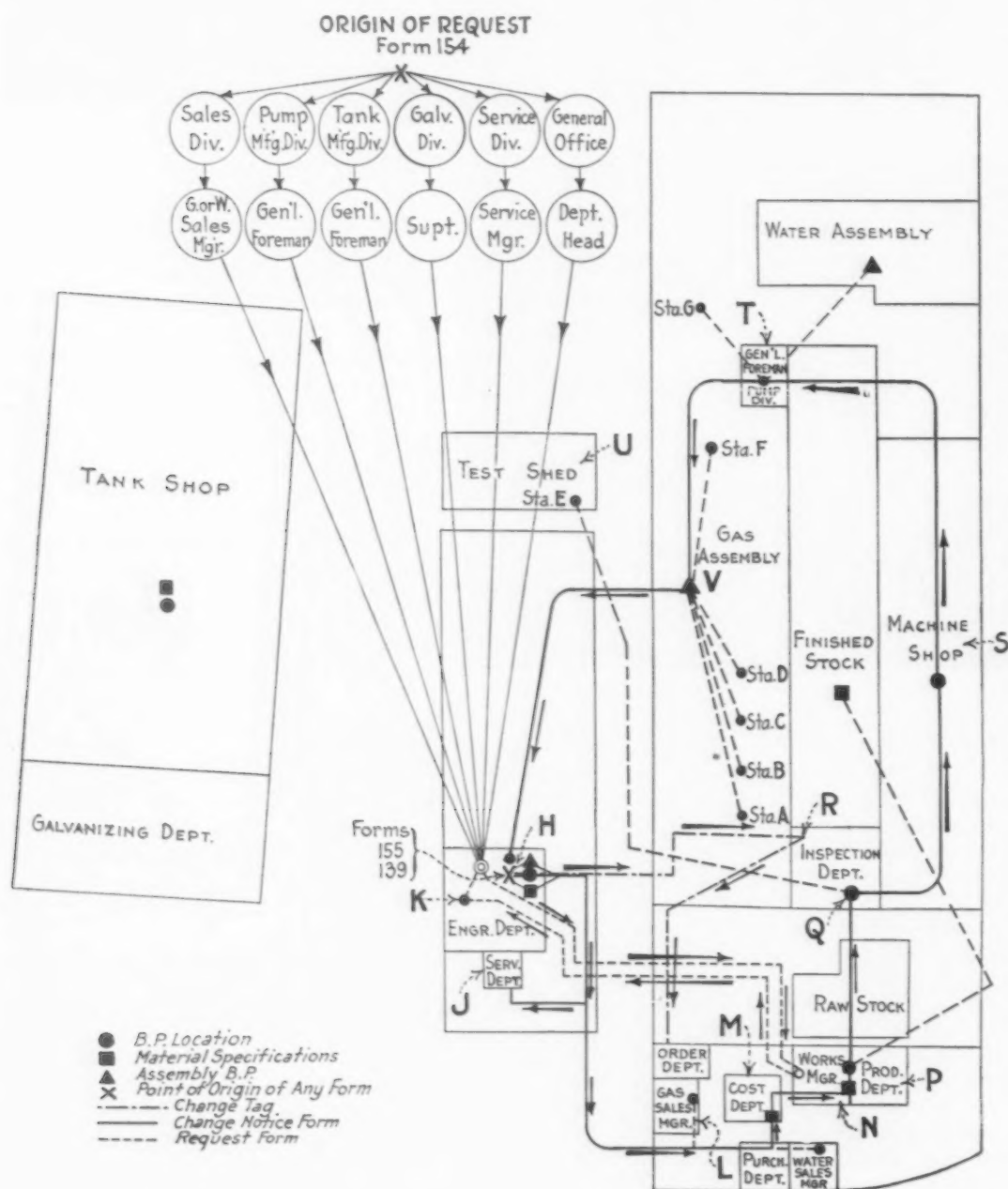
Making Improvements in Pump Parts

Engineering Supervision Over Details Prevents Confusion
in Shop—Effective Method of Shelving
Obsolete Data

IN every plant making a product which consists of a multitude of assembled parts, there constantly are minor changes in the design of the individual parts being made. In addition, the management of such a plant generally receives for consideration from time to time suggestions by employees which affect in either a small or a large way the design of its product. Therefore it is essential to have some regular method for handling these matters which will expedite decisions in regard to engineering changes, and which will avoid confusion or mis-

takes on the part of those departments affected by the changes.

At the Dayton Pump & Mfg. Co., Dayton, Ohio, maker of pumps and tanks for gasoline filling stations and of domestic water supply equipment, a system has been put into effect which simplifies this procedure. A suggestion for an engineering change may originate in any department outlined on the accompanying chart. To give every suggestion the official stamp of attention and to give credit to the proper person, as well as to fix responsibility



Form No. 154
D.P. & M. Press

**REQUEST
For Engineering Change**

No. _____ Date _____

Part Name _____ Part No. _____

Pur. No. _____

Model No. _____ Sheet No. _____ Line No. _____

Used on: ☐ Gas Pump ☐ Water Pump ☐ Softener ☐ _____

SPECIFICATION OF REQUEST:

REASON FOR REQUEST:

Route of Request _____ Date _____ Remarks _____

Originator _____

Gen. Foreman _____

Eng. Dept. _____

Works Mgr. _____

Nature of Request	Stock on Hand
Service Change	Und. Pers. Change
Drawing Change	On Order
Pattern Change	New Stock
Tool Change	Machine Shop
Material Change	Finished Stock
Specification Change	Assembled Stock

EFFECTIVE:

(See Sketch - Other Side)

Form No. 155
D.P. & M. Press

ENGINEERING CHANGE NOTICE

No. _____ Date _____

Effective _____

Part Name _____ Part No. _____

Pur. No. _____

USED ON

Spec. No.	Sheet No.	Line No.	Spec. No.	Sheet No.	Line No.

Specification of Change

Reason for Change

Disposition of Stock	Route of Notice	Noted	Agreed
Should Purchase Order be cancelled?	Engineering Dept.		
Should Purchase Order be changed?	Service Dept.		
Should Raw Stock be scrapped?	Production Dept.		
Should Finished Stock be scrapped?	Purchasing Dept.		
Should Assembled Stock be scrapped?	Machine Dept.		
Should Obsolete Stock be serviced?	Inspection Dept.		
Should Finished Stock be reoperated?			
Are Underwriters' Drawings Affected?	Cost Dept.		
Does Change affect service?	Gen. Foreman		
	Works Mgr.		

FORM 154, Request for Engineering Change, Is the Initial Step in Improving a Part. This follows the dotted line in chart on opposite page, through engineering department, to works manager and back. With approval, Form 155, Engineering Change Notice, is made out and sent on its rounds, as shown

for failure to consider a suggestion, a "change request," known as form No. 154, has been adopted. The originator fills in the request blank, signs his name and delivers it to the head of the department in which he is working. The latter notes the nature of the request, makes any necessary comments on the "change request," signs it and forwards it to the engineering department.

As soon as the request is received by the engineering department, it is numbered and entered in a "request-filing book," for permanent record. The head of the engineering department studies the request and either accepts or rejects it. If it is rejected, it is filed and the originator is notified of the reason for its rejection; no request is destroyed. If it is passed, it is signed and submitted to the works manager, whose approval must accompany all requests for changes before they are put into effect.

After its acceptance by the works manager, the "change request" is returned to the engineering department, which makes out an engineering change notice, form No. 155.

This lists in detail the exact nature of the changes and the specifications for every model of the company's product using such a part. The disposition of the stock affected by the change is noted on this form for the guidance of the stockroom. If the new part is not interchangeable with the old part in pumps already in the service of customers, special care is taken to obtain the serial number of the last pump having the obsolete part and the first pump having the new part.

This is done by using a service tag, called form No. 139. About ten of these tags, typewritten with the change numbers and a general description of the change, are given to the chief inspector, who attaches them to the first ten pumps in which the new part is incorporated, so that the serial number of the pumps can be readily secured. The serial number is sent to the order department, which takes care of the service parts. By following this plan the company reduces to a minimum the possibility of error.

After the engineering change notice has been routed to

FORM 139 Consists of a Tag which Accompanies the First Few Parts, of the New Design, Through the Works and Facilitates Keeping the Records Straight as to Serial Numbers of Equipment So Fitted

CHANGE	SERIAL NUMBER _____	DATE _____
	Nature of Change	
	Change No. _____	
	Office Stub _____ Insp. Sig. _____	
INSPECTOR'S STUB Serial No. _____ Change No. _____ Nature of Change _____ Date _____ Inspector _____		

the heads of the departments affected by the change and signed by them, it is returned to the engineering department. Here these changes are entered into the engineering specification book, kept in the department, and later in duplicate engineering specification books kept in various outlying departments, such as machine shop, stock, production cost, inspection and order departments. The change notice is then attached to the original request and filed for record.

Study of the accompanying chart shows that blueprints of parts are distributed to a minimum of departments. Moreover, whenever a blueprint of a new part is delivered to a department which must have a copy on file,

the blueprint of the old part is collected by the engineering department and destroyed. The original copy is kept on file in the engineering department, but the removal of the old blueprints from the various departments eliminates the possibility of error.

Changes in the tank shop and in the galvanizing department (pump division) are handled in a special manner by engineering department and works manager, in consultation with the superintendent of the shop that is affected.

A copy of every engineering change notice goes to the sales manager, to keep him abreast of every improvement made in the company's products.

Schedule of Foundry Meetings at Chicago, April 8 to 11

THE final technical program for the spring meeting of the American Foundrymen's Association at the Stevens Hotel, Chicago, April 8 to 11, has been completed. In THE IRON AGE of Feb. 7, page 423, the tentative program was printed, but the days on which each session is to be held were not given. These are definitely as follows:

Monday, April 8
Afternoon:
Committee Meetings.
Annual Business Meeting.
Gray Iron and Steel Shop Operation Courses.
Annual Exhibitors' Dinner.
Dinner—Engineering and Shop Instructors.

Tuesday, April 9
Morning:
Foundry Costs.
Steel Founding.
Effect of Blast Furnace Operation on Pig Iron and Castings.
Noon:
Round Table Luncheon and Meeting on Non-Ferrous Foundry Cost Methods.
Round Table Luncheon and Meeting on Steel Founding.
Afternoon:
General Foundry Practice and Management.
Fundamentals of Sand Control.
[The Gray Iron and Steel Shop Operation Courses scheduled for this time will be combined with this meeting.]
Dinner Gathering of Those Interested in Sand Control.
Evening:
Sand Control.

Wednesday, April 10
Morning:
Non-Ferrous Foundry Practice.
Iron Foundry Practice.
Materials Handling.
Noon:
Round Table Luncheon and Meeting on Non-Ferrous Shop Practice.
Afternoon:
Foreman Training.
Gray Iron and Steel Foundry Shop Operation Courses.

Thursday, April 11
Morning:
Malleable Iron.
Apprentice Training.
Noon:

Round Table Luncheon and Meeting on Malleable Iron Foundry Practice.

Afternoon:
High-Test Cast Iron.
Gray Iron and Steel Shop Operation Courses.

Technical papers added to the various sessions, which were not included in the tentative program published in February, are as follows:

General Foundry Practice and Management, Tuesday evening: "Baking Practice for Oil Sand Cores," by H. L. Campbell, University of Michigan, Ann Arbor, Mich.; "Core Oil Testing and Specifications," by V. A. Crosby, Studebaker Corporation, South Bend, Ind., and "Science Hand in Hand with Labor," by Frank Hudson, chief metallurgist Glenfield & Kennedy, Kilmarnock, Scotland, annual exchange paper of the Institute of British Foundrymen.

Fundamentals of Sand Control, Tuesday, 4 p. m.: "Sand Control in the Malleable Foundry," by W. Ranis, Union Malleable Iron Co., Moline, Ill.; "Sand Control in Gray Iron Foundries," by R. F. Harrington, Hunt-Spiller Mfg. Corporation, Boston; "Reduction of Scrap," by E. W. Smith, Crane Co., Chicago, and "Sand Control in the Steel Foundry," by H. A. Mason, Gould Coupler Co., Depew, N. Y.

Sand Control—Practice and Research Developments, Tuesday, 7:30 p. m.: "Sound Castings," by R. W. Kurtz of James B. Clow & Sons, Newcomerstown, Ohio, and "Some Experiments in Sand Control," by E. F. Wilson, Jefferson-Union Co., Lockport, N. Y.

Iron Foundry Practice, Wednesday morning, April 10: "An Analysis of 54-In. Cupola Performance," by E. E. Marbaker, Whiting Corporation, Pittsburgh.

Foreman Training—A Symposium, Wednesday, 2 p. m.: Chairman, B. H. Johnson; led by the following speakers: W. F. Coleman, W. A. Jones Foundry & Machine Co., Chicago; A. B. Peirce, director Department of Industrial Education, National Metal Trades Association, Chicago; M. H. Mellen, supervisor of education, General Electric Co., West Lynn, Mass.; G. A. McGarvey, agent, Industrial Education, Federal Board of Vocational Education, Washington; A. D. Lynch, personnel director Ohio Brass Co., Mansfield, Ohio; L. A. Hartley, educational director National Founders Association, Chicago.

Malleable Iron, Thursday morning: "Shrinkage in Malleable Iron Castings," by H. A. Schwartz, National Malleable & Steel Casting Co., Cleveland.

Apprentice Training, Thursday morning: Discussions on the two papers led respectively by A. E. Harrison, Allis-Chalmers Mfg. Co., Milwaukee, and by C. D. Carey, American Steel Foundries, Verona, Pa.

High-Test Cast Iron—A Symposium, Thursday evening: Additions to the leaders of the discussions on American developments are O. Smalley, Brooklyn; J. W. Bolton, the Lunkenheimer Co., Cincinnati, and E. J. Lowry, Detroit.

For the leaders of the discussions at the shop operation courses on steel foundry and gray iron foundry practice to be held each day at 4 p. m., the following have been selected:

Pouring Practice—Monday: A. F. Burt, Pettibone-Mulliken Co., Chicago; E. F. Wilson, American Steel Foundries, East Chicago, Ind.

Sand Control: H. A. Mason, Gould Coupler Co., Depew, N. Y.

Core Room Practice: E. R. Young, Detroit Steel Casting Co., Detroit.

Heat Treatment: W. C. Hamilton, American Steel Foundries, East Chicago, Ind.; A. W. Lorenz, Bucyrus-Erie Co., South Milwaukee, Wis.

Cupola Control, Raw Materials: Prof. R. S. McCaffery, University of Wisconsin, Madison, Wis.; David McLain, McLain's System, Inc., Milwaukee, and M. J. Evans, Mathieson Alkali Works, New York.

Sand Control: R. F. Harrington, metallurgist Hunt-Spiller Mfg. Corporation, Boston.

Gating and Rising: P. R. Ramp, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.; P. T. Bancroft, John Deere Harvester Works, Moline, Ill.

Cupola Control—Influence of Cupola Operation on Character of the Iron: Dr. F. W. Meyer, National Radiator Co., Johnstown, Pa.; F. K. Vial, Griffin Wheel Co., Chicago; H. W. Dietert, U. S. Radiator Co., Detroit.

The exhibition, to be held in the Stevens Hotel, will be open every morning at nine. Over 100 exhibitors have already taken space.



Fundamental Studies of Furnace Design

Development Laboratory Uses Basic Data in Approaching Particular Problems for Many Industries

AN industrial furnace department conducted separately from the production department is maintained by the Surface Combustion Co., Toledo, Ohio, to solve problems in making industrial furnaces keep pace with the progress of other mechanical equipment. Believing that the design and construction of industrial furnaces has often been undertaken without intimate and accurate knowledge of industrial processes and industry's need, the company established the department about three years ago. That it has accomplished its purpose along the lines laid out, and has become an efficient part of the organization, is said to have been proved by the results obtained.

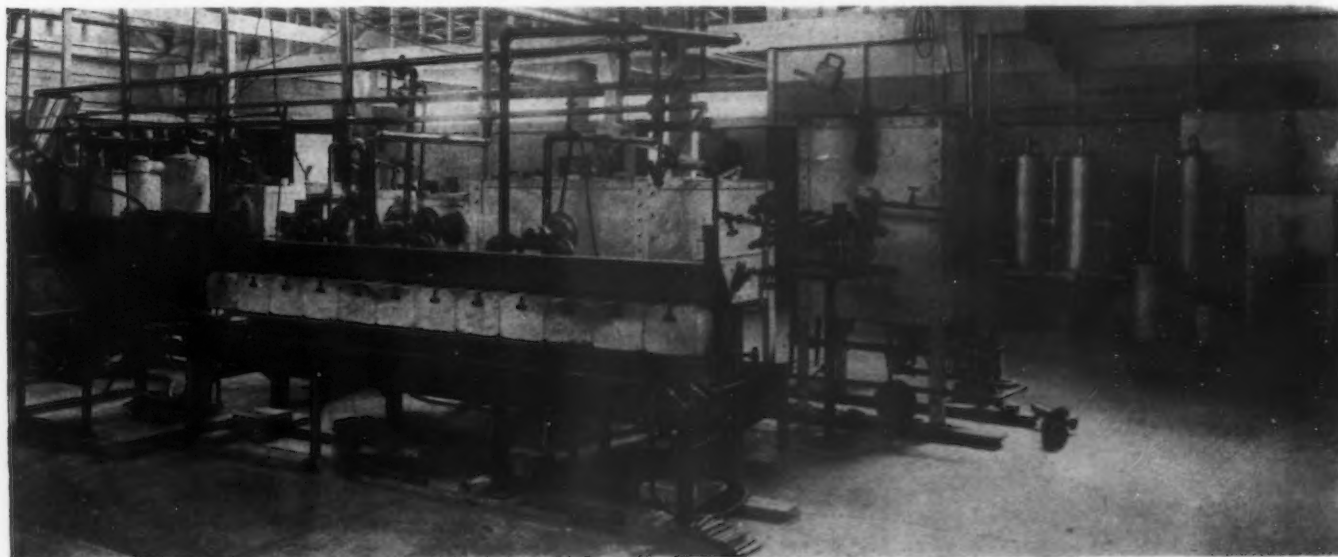
Divided into two sections, commercial development and pure research, the department has its own organization. Being provided with metallurgical and chemical laboratories, it is fully equipped to handle the most intricate heating problems, from verification of basic data to build-

ing the furnace. The American Gas Association is cooperating with financial assistance.

Working with the Purchaser

Rapidly changing manufacturing conditions involving consideration of margins of economy and the specifying of new products made it imperative that, as one of its chief functions, the development department should study manufacturing processes in various industries. It was not to be expected that the manufacturer using heating processes should be a furnace expert; that is the business of the furnace builder. The manufacturer, of course, knows the requirements for his finished product, but often, it is pointed out, his specifications for the heating processes are incomplete or inaccurate.

Acceptance of such specifications as correct has frequently been responsible for the building of a furnace



In the Laboratory of the Development Department Are Furnaces of Various Sizes and Types, Used for Experimental Work

unfitted for its work and the cause of considerable expense. Therefore, the originators of the development department plan saw that an intimate and accurate knowledge of industrial processes was necessary. Moreover, the services of expert, practical chemical, metallurgical and furnace engineers were needed, to coordinate such information and to verify, if required, every detail of a manufacturer's heating process specification.

Study of furnace design is the next function of the department. After data are at hand with which to check the accuracy of a manufacturer's specification, the engineers must lay out a furnace capable of doing the work. Furnaces constructed on a hit-or-miss plan, only to be rebuilt later, until the desired results are secured are, it is said, expensive and seldom wholly satisfactory. Therefore, in this department, the furnace is designed, built and tested under service conditions so that there is every assurance that the new type will be acceptable.

Survey of Process Industries

Naturally, the department, in its close contact with processes and with the construction of furnaces, has a wealth of highly valuable general data. This information is used as a basis for an annual survey of many metal-working and process industries, which serves as an analysis of the trend of furnace applications. Besides this, the survey locates opportunities for the assistance of industry by the development of new ideas for existing furnaces and for special types. The survey is broad, ranging from pastry baking ovens to soaking pit furnaces.

A typical case may serve to show the operation of the department. A manufacturer develops a new product, the making of which requires a certain heat treatment. Not knowing exactly what type of furnace will answer his requirements, the problem is submitted to the development section. Specifications are given for the heat treatment and the finished work, as are also the furnace performance essentials.

To check the certainty of results to be secured by following these data, the chemical and metallurgical engineers verify the necessary details. Any changes suggested by these men are worked out with the manufacturer's engineers until a satisfactory arrangement is reached.

With this complete information at hand the general type of furnace is decided. It may, perhaps, be a simple adaptation of an existing type or it may call for an entirely new style.

Experimental Model Followed by Full-Size Furnace

The design settled, the experimental models are built up in the laboratory. Tests are carried on until all the details are settled. Then an actual field furnace is built, tested and installed in the manufacturer's plant, but it remains under the control of the development department. When the unit has proved its efficiency by service tests, the plans are given to the production department and the manufacture of this particular type is started. In this way expert knowledge, research and practical experiment lead to the development of a furnace definitely suited to a particular job.

With its broad scope and need of exact information, the development and research department requires a trained personnel and the use of every essential facility both in men and equipment. The personnel consists of about 30 men—all college graduates and many with engineering experience. At the head of the department and in charge of the laboratories are a chemical engineer, who was formerly connected with a prominent malleable foundry, and a metallurgical engineer, who obtained much practical experience with a steel plant.

The laboratories contain complete chemical and metallurgical equipment, including photomicrographic cameras. Machine tools have been installed for the manufacture of experimental parts. Apparatus for the study of methods of combustion and the effects of atmosphere on metals is available, also. Furnaces of many types are provided to be used for experimental rebuilding and research work.

Appreciating the value of fundamental training along such lines as metallurgy, equipment, furnace erection and field service, evening courses of instruction are conducted by the department. These are made as practical as possible. They consist of lectures, followed by laboratory work along the lines of the lecture subject, and are conducted by engineers of the company.

Wire Splicing With Silver Solder

SILVER solder is a preferred material for joining wire rods or the heavier sizes of wire during the drawing operation, and for joints carrying electric current, according to information received from Handy & Harmon, Bridgeport, Conn. As the lengths of copper rod are limited by the size of the original wire bar, successive rods that are fed through drawing dies to make a long coil must be brazed together. Silver solder is used for this purpose because of its strength and ductility and because it "works fast."

The same process is used in joining lengths of wire for redrawing to lighter gages, and for repairing breaks during the drawing process.

To make the joint in rods or heavy wire, the ends are beveled and held tightly together in a vise and then subjected to a brazing heat, either from an electric arc or an oxy-acetylene or air-gas torch. Sometimes a clipping from a thin sheet of silver solder is inserted between the two beveled faces; in others molten solder is applied from a strip of wire held in the torch flame. The solders are "free-flowing," consequently they penetrate quickly and deeply into all parts of a joint, even though it may be almost in metal-to-metal contact. A properly made joint can hardly be seen in the finished article.

Silver solders have superior strength, ductility and electrical resistance, thus being much superior to the low-melting tin-base solders. Silver solders are alloys of sil-

ver, copper and zinc, whose melting points range from 1325 to 1600 deg. Fahr., inversely to the amount of silver contained.

An interesting operation is joining lengths of "copper-weld" wire, a wire with a steel center and copper envelope. The coefficients of expansion of these two metals differ materially. Another complication is the fact that the copper exterior fuses at 1980 deg. Fahr., and the steel core at about 2700. Yet a silver solder melting at about 1400 deg. Fahr. makes a perfect joint with both metals at once; a joint that holds through successive cold-drawing operations.

Silver solders are largely used in the manufacture, as well as in the field of splicing, of wires and cables for carrying electricity. Silver has an even higher conductivity than copper. Experience of telegraph, telephone and power companies indicates that a silver soldered joint resists corrosion and weathering satisfactorily.

Uses Sheet Steel Piling to Stop Vibrations

An unusual use for sheet steel piling recently has been made by one of the Michigan automobile companies. Vibration caused by the operation of heavy hammers in its forge shop brought complaints from residents in the neighborhood. To eliminate the ground shocks the company is placing steel piling around some of its larger hammers. If the experiment proves successful, piling may be driven around the entire forge shop.

Avoid Waste in Man-Power

Personnel Department Has Vital Influence on Production Schedules and Operating Profits by Guarding Health and Spirits of Workmen

BY DR. EDWIN HULME MC ILVAIN*

ADEQUATE wages, reasonable hours of work, opportunity for training, education and advancement and healthful working conditions are fundamental for success both for industry and the worker. Something of these qualities goes into the product of a harmonious organization.

All these factors have played an important part in the amazing growth of industry. It is not without reason that the average workman now comes to his job in his own car, takes a shower at the end of the day, puts on a clean shirt and goes home well dressed and looking the part of a citizen interested in well earned recreation and full of the joy of living. "An automobile in every garage" has supplanted, in the politician's affections, "the full dinner pail."

It is a trend that will continue to develop to the benefit of the producer and the workman. Chance, fate and the "act of God" still play a large part in human waste, but within the last ten years managers of industry have taken long steps forward in stopping the tremendous leaks in the profit side of the ledger, caused by unnecessary loss in man power.

By the humanizing of industry the reproach implied in the phrase "This is a machine age" has been removed. This same machine age has in the last decade actually accomplished more for people generally than all the centuries of other conditions. It has witnessed the more complete utilization of the forces of the earth and the air and the sea for the needs and desires of man. It has seen natural resources made of practical benefit to every human being. And it has progressed far enough so that man-power itself has been better employed not only for astounding improvement in industry, but strangely enough, for individual betterment.

In no field have these striking changes become more

*Director of employment service department, Edward G. Budd Mfg. Co., Philadelphia.



WORKS Manager Signs Requisition for New Men After Discussing Situation in Personnel Manager's Office

apparent than in American industry. The predominant idea of today, as indeed it has been in the past, is bigger markets and increased and better production. Employers, when estimating the cost of production, can, within a fine margin, put in figures the price of materials, tools and practically all inanimate overhead burden.

But when the subject of human energy comes to be added to the column, there is sufficient reason to pause and consider the many avenues through which costs may mount and profits escape. War conditions made it plain enough to the progressives in industry that a more intelligent utilization of man power is a vital factor in the better conduct of business.

Tough for Workers

Before human engineering, so-called, made its presence felt in industry, the waste of human energy was evidenced not only by lesser production and increased cost of production to the employer, but in inferior working and living conditions and a depressed spirit of working and living itself. Some of these conditions are still fresh in memory. The worker had to rise earlier and walk or take long, tiresome rides in crowded cars to his job. He worked longer hours in small, congested, poorly lighted and ventilated shops and offices. As he naturally tired badly under such conditions, attempts were made to speed up production by mental and oral lashing by the foreman.

When the noon whistle blew, the worker opened his kettle, and ate a dry, uninviting and often indigestible lunch. There was not time to go for proper refreshment, so he generally washed down this luncheon with a can of warmed over coffee or tea, or a growler of beer from a



What an Employment Department Must Contend with When Advertising for New Hands

nearby saloon. Thus fortified, he returned for the afternoon endurance test.

Promptly as the quitting whistle wheezed out its siren call, he with his crowd of fellow-workmen made hasty tracks for the street, bearing on face and clothes the tell-tale marks of honest toil. Bathing facilities, when they existed at all, were nothing to boast about. Leisure time meant little, as the worker was generally tired and grouchy and fit for nothing but bed by the time he reached home.

Loss of Man-Power

The war, however, revealed to the discerning ones in industry that they were losing heavily through poor selection and management of man-power. The workman's loss was also their loss. This discovery brought a keen realization that man-power was an element of industry which



GOOD Working Conditions for Assembling Light Parts. Foreman of women workers (with gage in hand) has same rank as a man foreman

must be selected and bargained for by one as perfectly trained as the purchasing agent who selected and bargained for the materials which were to be satisfactorily produced or hopelessly ruined by this man-power.

Introduction of the personnel manager into industry marked the first forward step in the elimination of human waste and the more effective handling of men. In the proper selection and placement of men the scientific viewpoint, as well as a psychological approach, was important. It paid to study national characteristics and personal temperament. For instance, it was discovered that a team made up of three of one nationality and two of another secures better production than five of the same nationality.

It was not long before experience and common sense showed that future improvement along these lines lay in recognizing and studying some of the social and personal needs of man as they were related to industry.

Health Now Tested

Present-day employment, for instance, is not complete without a physical examination. What manufacturer

would, if he knew it, put an imperfect part in the general assembly of an expensive and delicate tool? A physical examination will disclose the defects which keep a man on a low plane of vitality, and incapacitate him for his daily occupations.

This work by the physician has also kept many workers from the ever-increasing social scrap heap. Industries which maintain a system of medical service have many hundred loyal and productive employees who would otherwise have become social and financial burdens to their families or to the State.

Working Conditions

Ventilation and illumination then became matters of concern. Often the former had never been considered at all; or was arranged to suit some individual regardless of the comfort of the majority. Contrast with this the many plants built, reconstructed or rearranged with a view of meeting the scientific requirements of ventilation, to increase comfort and efficiency among the workmen.

It has been found that whereas an employee worked slowly, to save himself eyestrain and accident in a poorly lighted room, good lighting decreased spoilage, promoted efficiency, discipline and content.

Such a subject as locker rooms also came in for attention and correction. There is, perhaps, no one thing more welcome to a worker than a clean and safe place in which to keep his clothes. Few things are more disconcerting to the mental balance of a workman than to find that his pockets have been rifled or even that some part of his wardrobe has been stolen or tampered with.

Many Aids to Interest

Today in most plants of fair size there are to be found such aids to efficiency, interest, health and spirit as a well equipped restaurant, serving carefully selected and prepared foods at low prices. A first aid dispensary is even more common. Other worth while enterprises are a plant magazine, a building and loan association, a thrift club, group insurance, a sick benefit association and employees' stock purchase plan.

Where space is available, a central restaurant or cafeteria is probably best. A central restaurant, however, is impractical in a large plant. Workers having 30 to 45 minutes for lunch cannot go to a distant location, or even to another floor, eat leisurely, and return to their respective departments within the time limit.

A practical and successful system of feeding the employees was originated at the Budd plant nine years ago. As described briefly in *THE IRON AGE*, April 12, 1928, page 1003, all food is prepared and cooked at a central kitchen, equipped with every modern labor-saving device. The cooked food is then taken in trucks to booths located in various parts of the shops, from which it is served to the men working in that section.

Sanitation and safety engage the attention of committees of workmen. As "all work and no play" spoils efficiency, much may be added to the welfare and happiness of the worker through the mediums of education, social activities, band and orchestra concerts by talented members of the organization, athletic sports and recreation, picnics and theatrical performances.

Improvement in the design of large internal combustion engines for ships may be judged by figures referring to German naval practice. Twenty years ago 6-cylinder, 12,000-hp. engines were built to drive the middle propeller shafts of battleships then authorized. Although these ships were never launched, two engines were completed and passed acceptance tests. They weighed 110 lb. per hp. The recently authorized armored cruiser *Erstaz Preussen* is driven by internal combustion engines of 50,000 hp. which weigh only 17½ lb. per hp.



European Hot Sheet Galvanizing

Modern Methods Differ from Those in Use in United States, Because of Difference in Labor Conditions and in Size of Plants

BY DR. HEINZ BABLIK*

AS the sheet galvanizing process mostly used in Central Europe had its technical origin in the west of Germany, it might appropriately be called the modern German process. This process is characterized by the fact that the bath receives an addition of aluminum, and, further, that there is no flux used on the zinc bath. The product of this process is a galvanized sheet of the best bending qualities, which can be bent in every direction and as often as required without the zinc coating being damaged. The zinc coating will crack only in the event of the iron (or steel) base beneath it being broken.

Zinc Chloride Precedes Metal

The method of galvanizing is as follows: The sheets are pickled in a highly concentrated hydrochloric acid pickling bath, after which they are thoroughly washed in water and then dipped in a highly concentrated warm solution of zinc chloride. Sheets as removed from the zinc chloride bath are covered with a layer of zinc chloride. The next process is drying. When this has been done the sheets are dipped into the molten zinc bath, where they remain as short a time as possible.

Sheets thus galvanized are ready without the necessity of artificial cooling. They need only be flattened. Corrugating is not much in vogue on the Continent. The pickling reaction of highly concentrated hydrochloric acid is explained in detail in the second portion of this article.

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The reason for washing after pickling is clear. By this treatment every trace of acid should be removed, as well as the products of the pickling bath. The surface of the pickled sheet should not be covered with a layer of iron chloride, which must be washed away by the water.

Solution Acts as a Flux

Next is the dipping in the zinc chloride solution. Every possible care must be taken in preparing this solution, which can be made in any galvanizing works by dissolving zinc ashes in concentrated hydrochloric acid. Solutions obtained in this way must be thoroughly neutralized and filtered and freed of iron. A certain amount of ammonium chloride can be added, but this is not necessary.

This solution of zinc chloride, which covers the iron base after dipping the sheets in the solution, acts in this process as the flux, just as the sal ammoniac does in ordinary galvanizing. We must in this connection remember also that common ammonium chloride flux consists for the most part of zinc chloride.

Action of the zinc chloride solution as a fluxing agent will be explained by saying that it evolves dry HCl gas when heated, and that this acid dissolves the oxides. Further explanation lies in the fact that zinc chloride in a highly concentrated solution itself forms a strong acid of the formula $H(ZnCl_2OH)$, and that this same acid can dissolve the oxides.

It has been found that a 11N zinc chloride solution has the same hydrogen ion concentration as a normal solution

HANDLING Sheets in the New German Method of Galvanizing. In the background, at left, is seen the furnace in which the sheets are dried after being dipped into the zinc-chloride bath, preparatory to receiving their coating of molten zinc. This coating is much thinner than is the custom in the United States



of a hydrogen acid. This acid is capable, like every other acid, of dissolving metals or metal oxides. If the zinc chloride is molten, divalent metallic compounds of the type M (ZnCl_2O) are formed. When sal ammoniac is present a strong hydrogen acid of zinc-chloride is formed, $\text{H}_2(\text{ZnCl}_4)$, by the dissociation of the NH_4Cl into NH_3 and HCl .

Molten Flux Would Not Last

There are two reasons why in this process a molten flux on the zinc bath is not employed. The first is that on the zinc bath, with its content of aluminum, a common flux would not last. The NH_4Cl of the common flux would react with the aluminum of the bath by forming AlCl_3 , which evaporates at the low temperature of 184 deg. C. New AlCl_3 is constantly formed as long as Al is in the bath, and all the flux is shortly destroyed.

Some inventions have nevertheless been patented, claiming to make it possible for the sal ammoniac flux to last on a zinc bath alloyed with aluminum. None of these inventions has been very successful, and they are of only the slightest use if the aluminum content is low. Besides this, these inventions are needless for this process, as no flux on the bath should be employed. The reason is that, by the manner of dipping the iron sheet in the solution of zinc chloride, all foreign substances are better removed from the iron and the iron surface is covered with a good fluxing agent which will smelt clearly up when coming into touch with the molten zinc.

Particularly Good Adhesion Secured

The great advantage of this method is that it is possible to remove all trace of layers of iron salts and oxides, and that means an exceptional fixing of the coating, such as can never be obtained when a flux on the bath is used. The attainment of this good fixing is further due to the fact that by this process all hydrogen which could be dissolved in the iron base is removed before the sheets are dipped in the molten zinc. Thus no more development of hydrogen takes place during the forming of the zinc layer. Further, all traces of moisture are removed from the surface of the sheet when it is brought into contact with the zinc. These two facts have great influence on the perfect adhesion of the zinc coating.

The procedure of dipping into the molten zinc is executed with the help of apparatus as shown in the illustration. In the background is seen the oven where the sheets are dried between dipping in the zinc chloride solution and in the zinc bath. The thickness of the zinc coating can be controlled by adding more or less aluminum, so that the gain in weight can be changed between 300 and 700 gm. for both sides of a square meter.

This process is in use not only for sheets, but also for pails and similar goods, where a cheap galvanizing process is necessary.

Benefits from Aluminum Which Is Present

Besides its excellent bending qualities, this process is of advantage also because of the content of aluminum. It is known that aluminum is immediately covered in normal atmospheric conditions by a layer of oxides which are an excellent prevention against further attack. Also, as an alloy, it still possesses this characteristic, so that these coatings have a better quality in the matter of corrosion resistance.

All these facts together have therefore made this process the most representative of Continental Europe today, and it is not impossible that it may under certain circumstances be of value also for the galvanizing industry of the United States.

Conditions of the European—and especially of the Continental—galvanizing industry are quite different from those in the United States. We must remember that Europe, aside from Russia, has been divided as a result

of the war into 34 states, and that there are, within an area of 5,500,000 sq. km., as many as 34 independent political and economic units, whereas in the United States, in the much greater area of 7,500,000 sq. km., there is only one.

As each State, partly from an historical point of view, partly owing to war causes, must have a complete industry, so that every industrial product can be made within its own borders, the galvanizing works are in general nowhere near so large as is the case in the United States. With the exception of England, where there are galvanizing works comparing in size with those of the United States, there are hardly to be found in Europe galvanizing works which are working with more than four galvanizing kettles at one time.

Cheap Labor Requires Few Machines

Another difference in the economic structure influences also the constitution of the zinc industry. In Europe the average population on each square mile is more than five times that in the United States. The consequence is that hand work is in Europe much cheaper than in the United States. These two factors together, the small markets and the lowness of wages, have developed special processes in galvanizing.

Sheet galvanizing by machinery, as is the rule in the United States, is not so much in vogue, especially on the Continent of Europe, because the output of machine galvanizing would be too large for the small markets. Of course there are in Europe, and especially in England, a number of galvanizing plants which work in the same way as those in the United States, but that is not the characteristic European manner of working.

A third factor is of great importance and influence on the present European practice. Europe has lost by the war a great part of its capital, so that in consequence the purchasing power has been considerably reduced. As Europe is also far behind the United States in its wealth of natural products, manufactured goods are of necessity of a cheaper quality. It is possible to sell only articles which are low priced and at the same time also cheap from the economic point of view.

Thinner Coatings of Higher Quality

The effect on the galvanizing industry is that zinc coatings are much thinner than is the rule in the United States. It is the general opinion in Europe that thick zinc coatings are a waste of zinc, and make galvanizing more expensive without any corresponding advantage, at least for European conditions. The fact must be taken into consideration that the climatic attack on galvanized coatings on the Continent of Europe is far less severe than is the case in tropical or subtropical climates and in proximity to the sea.

The greatest efforts of the Continental zinc coating plants are therefore concentrated on producing thin coatings, as a means of making the galvanized sheets as cheaply as possible and upon the assumption that, in general, a thin coating will last as long as the building for which it is destined and to make the zinc coating thicker would be only a waste of material.

This view of things is supported by the fact that thick coatings are often a consequence of the use of impure zinc for galvanizing; on the other hand, thin coatings can be obtained only by using the purest spelter. And the purer the spelter, the longer it will resist atmospheric attack. The use of very pure and thin coatings, which last in comparison much longer than thick ones, seems from an economical standpoint to be the better method of making galvanized sheets.

(To be concluded)

Demand Forces Heavy Steel Production

Current Levels Indicated for Another Two Months, as
Consuming Activity Is at the Highest
Rate Since the War

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

THAT the spurt in steel production in the early months of 1929 has not been speculative nor in excess of current requirements is amply demonstrated by cold statistics. There have been periods when steel making has run ahead of actual needs, as in 1922 and 1923, or in early 1924. These periods have been accompanied by a considerable increase in forward buying and relatively high unfilled orders. At the beginning of 1929, however, steel production was below indicated requirements, thus giving ample economic justification for an increase in the output. Moreover, unfilled orders were low, indicating a very moderate anticipation of the future on the part of buyers.

Consuming Activity at Highest Level

OUR composite demand line is based on the activity in the chief steel consuming industries, thus indicating potential current requirements. This barometer in January reached the highest point since 1920. Perhaps it is the highest point for all time, as the index has not been carried back of the year mentioned. Obviously it is above any possible line of normal growth, thus reflecting the above-normal operations of the chief customers of the steel industry.

Our index of steel ingot production (adjusted to eliminate seasonal variation only) meanwhile continues at a very high level, but is practically stable. Considering the season, the total for January and February was a little below that for October and November. In short, steel production is below indicated current requirements.

The rise in the indicated composite demand in January was due to a combined increase in the activity of the automobile industry, in freight traffic, in manufacturing (excluding steel and automobiles), in mining and in exports. Building and construction showed little change; farm purchasing power was considerably lower than last fall.

As to the future, it seems probable that the demand for steel is nearing a peak, but that it will hold near present levels for at least two months more, during which the activity of the automobile industry, mining and the railroads will offset any slump in building.

Conditions in Specific Lines of Industry

Automobile production in February was at an even higher rate than in January, and present indications are that March has continued the pace. The output is almost certainly too large to be long maintained, but it means a continued heavy demand for sheets, strips and other items used by motor manufacturers, through March at least—probably through April. A heavy foreign demand for automobiles is a factor.

The railroads furnish a cheerful prospect. Freight tonnage increased in January and February and has been well maintained thus far in March. Earnings, both gross and net, show real improvement and net operating revenues are the highest for the season in many years. There is still a fair surplus of freight cars, but it has been considerably reduced and buying of freight cars and locomotives is on the upgrade. The long-suffering equipment industry appears

really to have turned a corner. Even in the case of locomotives, we find that unfilled orders showed an appreciable increase in February.

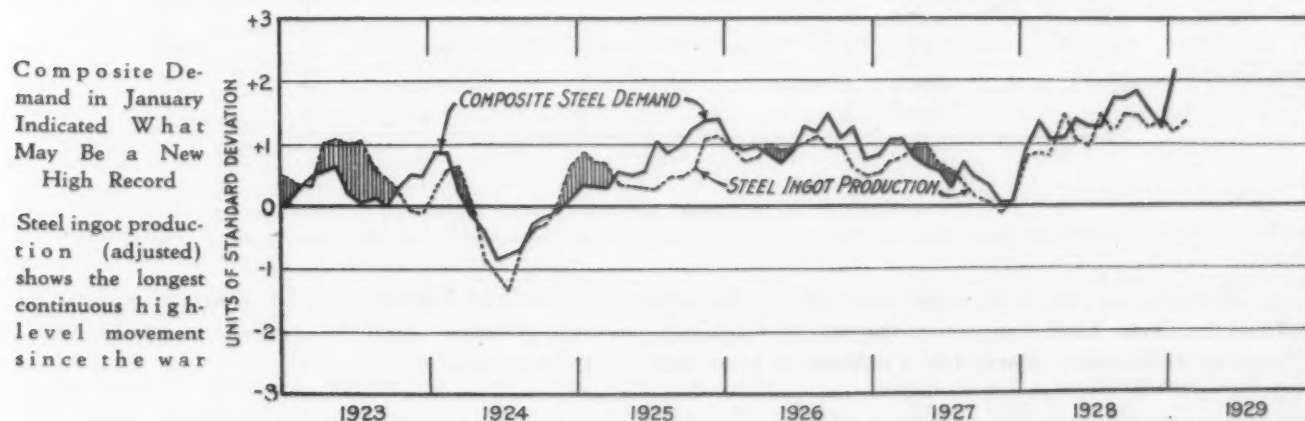
The building and construction industries present the least hopeful aspect. In fact, February was the poorest month for these industries in two years. The trend, moreover, seems to be definitely downward and the end is not in sight, for it is evident that high money rates are the chief factor in the decline and such rates promise to continue. The building situation is bound to affect the demand for steel unfavorably. Even in this case, however, construction of bridges, pipe lines, railroads, public works and utilities, etc., seems likely to keep up the volume of heavy construction, in spite of a decline in residential building.

Mining, including oil production, has reached a notably high level and is likely to show further expansion, as is usual in this phase of the business cycle. Strenuous efforts are being made to curtail oil production, but as yet they have had little effect and the results are still uncertain.

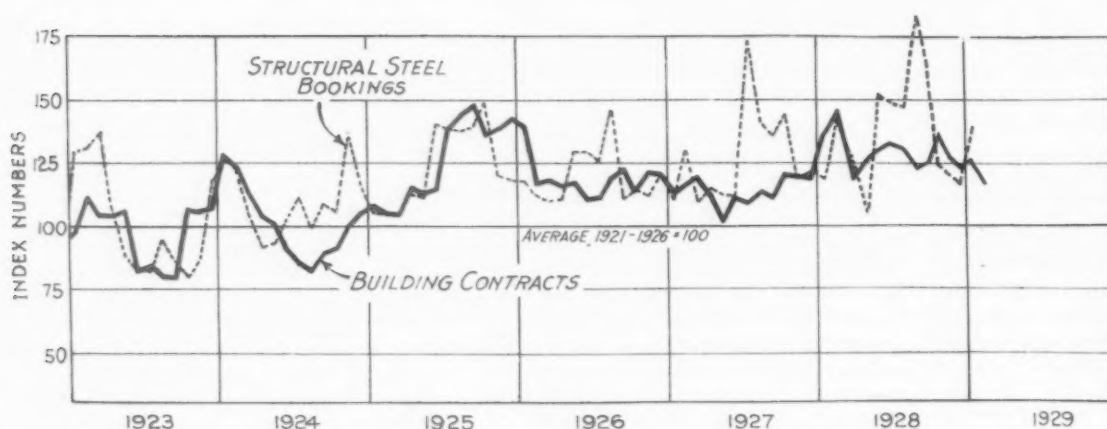
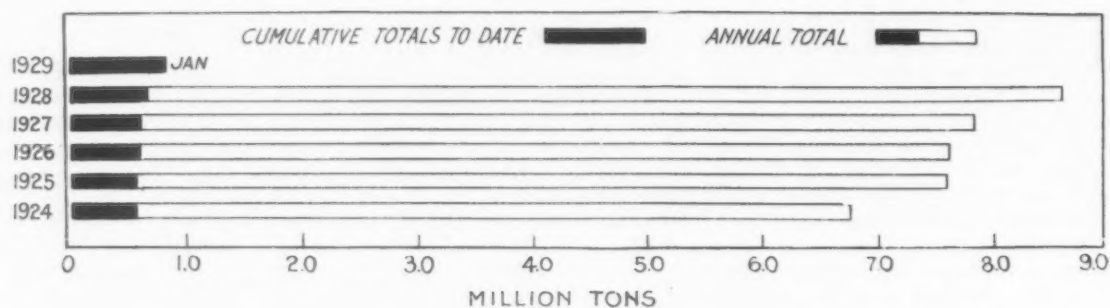
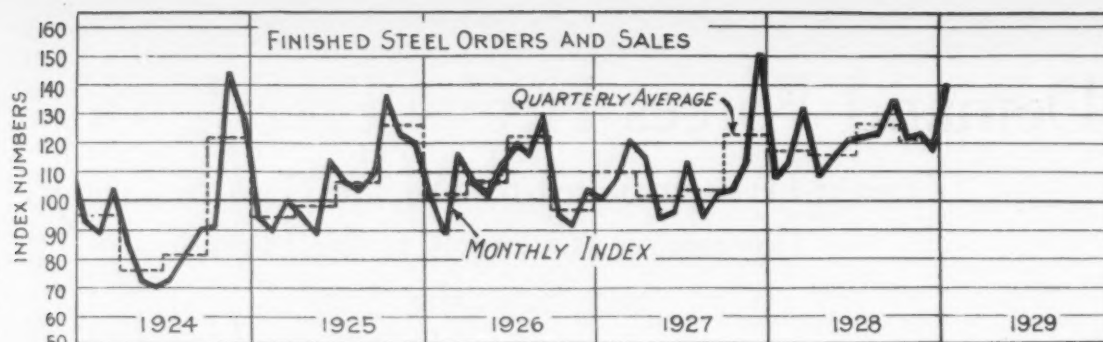
General manufacturing activity shows an upward trend, even when the automobile and steel industries are not included. Increases in such industries as textiles, tires, machine tools and tobacco have thus far more than offset declines in some building materials and a few other lines.

Highest January Sales Ever Recorded

THESE conditions are reflected in a sharp January rise in the sales of finished steel. Probably the combined orders and sales, covering some

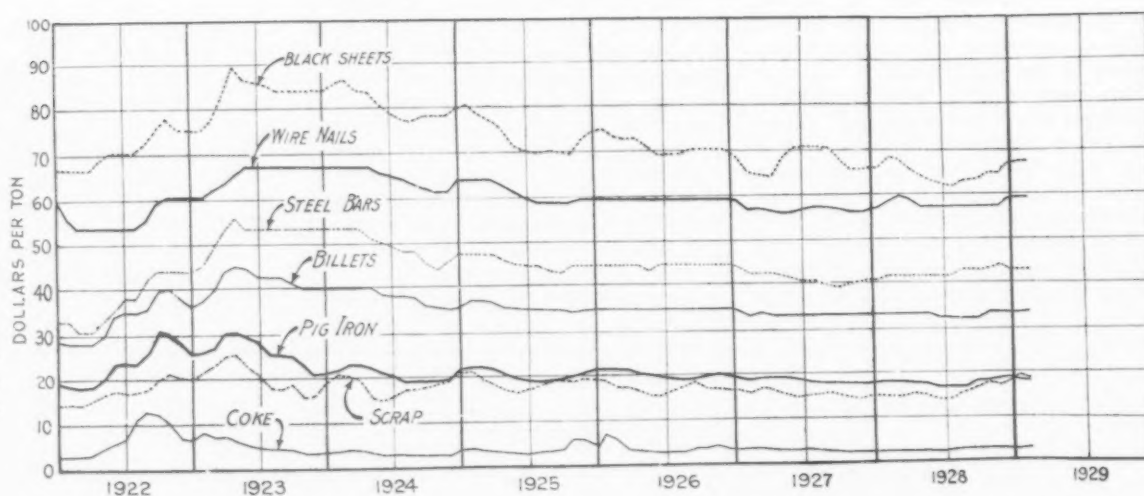


Buying of Finished Steel Made a Large Gain in January, the First January Increase in Recent Years, Following the Highest Year's Level Ever Reached



Building Contracts Have Continued their Downward Movement and Structural Steel Bookings Indicate a Tendency to Follow the Same Course Without Great Delay

Except for Steel Scrap, the Iron and Steel Price Structure Is Almost Normal. Bars are perhaps a little low. Scrap prices appear ready for a smart decline. Pig iron may go a bit higher before a further drop



Schedule of the next instalments of the *Business Analysis and Forecast*, by Dr. Lewis H. Haney, Director, New York University Bureau of Business Research, follows: April 4—Activity in Steel Consuming Industries; April 18—Position of Iron and Steel Producers.

of the chief items, broke all records for the month. They have been exceeded in recent years only in March, 1923, November, 1924, and December, 1927. The increase from December to January is the only gain between these two months that has occurred in recent years.

Doubtless this showing was influenced somewhat by the extra business day in January, following a December that had only 25 working days. But the chief factor was the extraordinary activity of the automobile industry as reflected in sheet sales. At 438,400 tons, the sales of this item of finished steel were the highest since December, 1927. Also notable, though taking a much smaller tonnage, is the gain in orders for steel castings. These amounted to 125,800 tons, which is the highest total for any month since March, 1924.

Less Building But High Structural Sales

FABRICATED structural steel bookings barely held level with December, but this is a good showing, considering the season. In fact, the January volume was the largest for that month that appears on our record. Fabricated plates work alone shows a decline in sales, the tonnage being only 32,700. This is a decrease in a month that usually shows an increase, and is the lowest figure for that month since 1926.

It is thus apparent that the booming automobile and farm equipment industries continue to feature the steel demand. Were the curve in the second chart adjusted for seasonal variation, it would doubtless show a peak above all previous records.

The third chart shows our adjusted curves of building and construction, and of fabricated structural steel bookings. The building curve turned downward quite sharply in February, and was the lowest for any month since September, 1927. Even allowing for seasonal conditions, there has been a considerable decline since last October. Indeed, in spite of much irregularity, the broad trend has been downward since February, 1928. This trend comes as forecast, and, being based on high money (together with an ample supply of buildings), it seems to be really significant and likely to continue.

Structural Orders Still Good

THE decline in construction, however, has not yet been reflected with certainty in structural steel bookings. In January these bookings amounted to 246,400 tons, which is practically the same as in December. As the January volume is generally a good deal lower, the showing is really a good one, as appears in the adjusted curve shown in the chart. Occasional heavy projects continue to keep up the volume and seem likely to continue to do so. February trade reports, however, indicate a decline in the average weekly bookings, and as in the past, they will doubtless in due

time conform to the downward trend of building activity.

Steel and Iron Production Continue High

Our adjusted index of steel ingot production recovered in February, reaching nearly the same annual rate as last December. Allowing both for the normal growth of the industry and for the usual seasonal variation, this index is now 115.8 per cent of normal. The current record shows the longest stretch of steel production at a level about 16 per cent above normal that has existed since the war. The industry seems near a peak, but, as noted above, its activity is still justified by an above-normal activity in consuming lines.

Finished steel prices remain stable, and a curve of such prices is close to a normal relationship with a curve of unfilled orders. The latter shows only a slightly rising trend and is considerably below a year ago.

Pig iron production continues to show a remarkably steady expansion. Allowing for long-time trend, and for the merely seasonal changes from month to month, the output of pig iron in February was the highest since February, 1925. It is 118.5 per cent of normal, which compares with 117.6 in January and 104.2 a year ago. It has risen from the low point of 93.2 in November, 1927, an increase of 27 per cent.

Thus there has been a large cyclical upswing, which has lasted for 15 months. The termination of the move is probably only a matter of a few months now. The present rate is still justified by the level of steel production—considering the height of steel scrap prices—but there is now danger that the momentum of pig iron production will carry too far and bring overproduction.

It should be noted that pig iron prices, according to THE IRON AGE index, averaged \$18.38 in February, against \$18.43 in January and \$18.52 in December. They are only 86 per cent of the average for the years 1923-1927.

Scrap Prices Far Out of Line

OUR price chart indicates that the iron and steel price structure is on the whole fairly normal. Pig iron prices are reasonable and in a normal relation with the prices of coke, semi-finished steel, and such finished items as bars and nails. Pig iron is certainly not too high in comparison either with steel or with steel scrap. The price of billets appears to be "about right." Perhaps bars are a little low, and the same may be said of sheets, but no complaint is to be made as to the present level of wire nail prices.

The outstanding maladjustment is found in the price of steel scrap. This is very high in comparison with both steel and pig iron, and a further decline is probable before long.

In view of the foregoing discussion, it seems likely that pig iron prices

will recover somewhat from the weakness of January and early February. Unless all signs fail, however, they will then react again, in two or three months from now. It should be noted that pig iron prices frequently rise for a short time after the scrap market reacts.

It is our surmise that sheets will hold firm for a month or two and then decline, and that nails will follow sheets. Insofar as we can see, the probabilities are that bars and billets will hold present levels for a considerable period.

Further Decline in Wholesale Prices

Prices of commodities at wholesale, as reported by the United States Bureau of Labor Statistics, showed an index number in February of 96.7, compared with 97.2 in January. The February level was the same as that of December and November, but the general tendency has been downward since 100.1 was registered for September. Nearly all of the major groups of items showed declines in February, compared with January, although most of these were fractional.

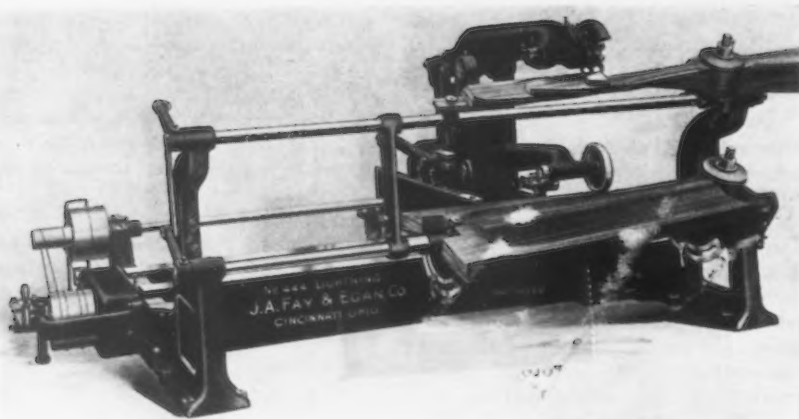
Metals and metal products advanced during the month from 103.6 to 104.4, mainly because of an increase from 100.7 to 105 in non-ferrous metals. There was a fractional advance in iron and steel, while agricultural implements, automobiles and other metal products remained stationary. Building materials went up during the month from 96.6 to 97.5, owing chiefly to a gain of more than two points in lumber prices.

Gain in Power Consumption in February

Productive activity in the United States in February as reported by *Electrical World* was greater than in January. The February index, based on electrical energy consumption of about 3600 scattered manufacturing plants, was 140.4, compared with 132.5 in January. The largest gains were made in the metal industries group, the index for which advanced from 142.6 to 157.3. Both steel mills and other metal-working plants participated in this increase. Automobile manufacturers made a good gain, while smaller gains were recorded by several other industries. In a few instances there were slight recessions.

Decline in Stoker Sales

Sales of mechanical stokers in February are reported by the Department of Commerce at 80 units of 31,554 hp. This is a drop of 25 per cent from the January total of 42,392 hp. and represents the smallest rating since November. It compares with 43,643 hp. in February, 1928, and with 44,536 hp. in February, 1927.



Shapes Airplane Propellers Automatically

FOR making metal or wood airplane propellers, the J. A. Fay & Egan Co., Cincinnati, has put on the market the automatic shaper here illustrated. This machine, designated as the No. 444, is intended for propellers up to 14 ft. swing, and of either two, three or four-blade type. Any shape or pitch blade can be manufactured, and no metal forms or patterns are required. The company claims that this is the only machine on which it is possible to take a broken propeller, glue the parts together, and make a duplicate thereof without using the original pattern.

The carriage of the machine moves longitudinally on the bed plate, and is arranged to support two pivoted

arms mounted on a reciprocating headstock, the lower arm carrying the "original" roller and the upper one the cutterhead. The arms are connected by a link, which is adjustable to permit variation in the size of reproduction, if desired. The headstock is reciprocated transversely across the work, and as each edge of the stock is reached, the carriage moves automatically along so that the cutting takes place both on the forward and backward strokes. When the carriage arrives at the end of the blade, the work is rotated on its mandrel, and cutting is done on the reverse traverse. Two rates of feed, with automatic control to prevent overrun, are provided.

Power Squaring Shears of Welded Steel

BUILT of electrically-welded steel plate, the squaring shears illustrated are claimed by the maker, the Dreis & Krump Mfg. Co., 7430 Loomis Street, Chicago, to be non-deflecting and unbreakable.

Timken roller bearings on the flywheel shaft are intended to assure ease of operation and reduce power requirements. The "super" hold-down employed is designed to provide uniform pressure on the metal before the cutting operation is started and to

hold the same pressure until the stroke is completed. Centralized hand-operated lubrication is provided for all slides and bearings, excepting the roller flywheel shaft bearings, which, with the clutch, are lubricated from oil or grease cups. Complete safeguarding of both ends of the shear, and the front and rear, with heavy sheet steel guards is a feature.

These machines are made in lengths

ranging from 3 to 12 ft. and for cutting from No. 14 gage to ½-in. mild steel. The shears illustrated are of under-drive type and are equipped with belted motor and crank gear drive. The rear view shows the construction of the upper knife bar, the screw adjusting back gage with steel scale and pointer, and other details. The rear guard, which protects the working parts from dirt, scale and scrap, is shown in place.

Small Portable Saw Bench

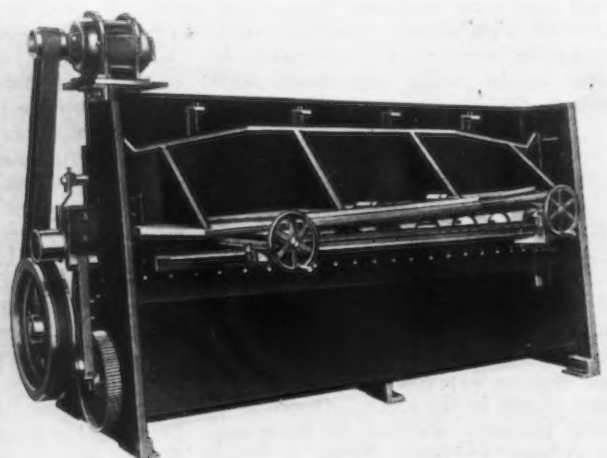
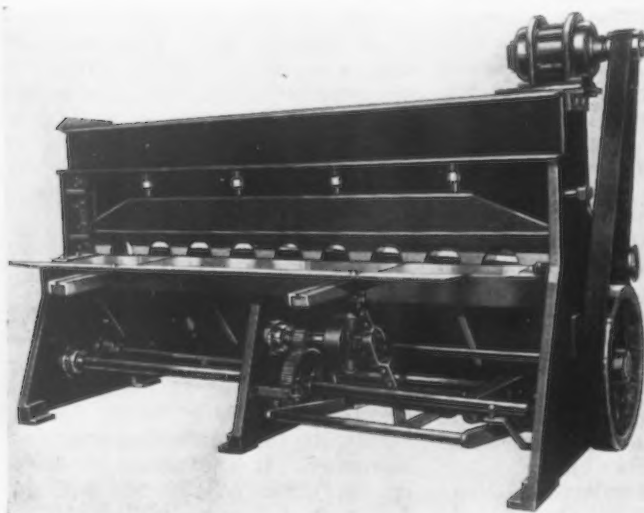
A PORTABLE motor-driven tilting arbor saw bench for use in pattern and experimental shops, in crating and other departments has been added to the line of the Oliver Machinery Co., Grand Rapids, Mich. The machine is arranged for operation from



With 7-In. Saw the Machine Will Cut to a Depth of 2 In.

a lamp socket, and with a standard 7-in. saw will cut to a depth of 2 in. With an 8-in. saw, cuts up to 2½ in. deep can be made. The machine will dado and groove up to ¾ in. wide by 1½ in. deep and will cut compound miters in one operation.

In general design this saw bench, which is designated as the No. 191, is similar to the larger stationary



Construction of the Upper Knife Bar May Be Seen in Rear View Above. Heavy guards are provided at both ends, as well as front and rear, of the squaring shear

unit described in *THE IRON AGE* of Feb. 9, 1928. The table remains level at all times. For angle sawing the saw may be tilted, the angle of inclination being shown on the scale at the front of the machine. The saw raises and lowers for changing the

depth of cut, which permits the table to be positioned at a convenient working height at all times. The machine is driven by a ½-hp. ball-bearing motor, and control is by means of the switch on the front of the machine. The table measures 25 x 30 in.

Portable Grinder Uses High-Speed Bakelite Wheels

A NEW high-production portable pneumatic grinder designed to use 8 x 1-in. bakelite, rubber and elastic bonded wheels at speeds up to 9000 surface ft. per min., is being announced by the Rotor Air Tool Co., 5905 Carnegie Avenue, Cleveland.

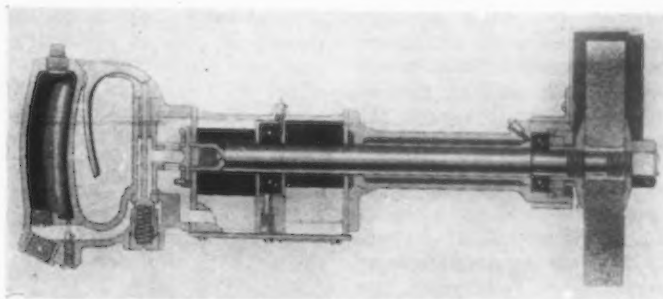
Two important improvements are the new design of rotor and the new rotor governor, features which will be incorporated in all pneumatic tools

vents the wheels wearing out of round and increases the life of the wheels. The new patented rotor governor controls the speed, regulating the intake air and keeping the machine at a constant speed under load.

The D-3 grinder, with guard, weighs only 16 lb. and it is regularly furnished with either straight or spade type of handle. It is adapted for grinding materials of high tensile

adjusting screws afford means of compensation for wear. An upright, integral with the slide, holds the diamond tool and a setting gage. With this attachment outlines having concave or convex radii varying from 0 to 1 in., and face angles up to 90 deg. either side of zero, can be formed. Numerous combinations of radial and angular shapes otherwise difficult to obtain can be developed.

Convex and concave shapes are obtained by setting the slide, by means of the scale, to the desired radius, and clamping it in position. The diamond point is set by the diamond tool setting gage. The diamond is then swiveled through an arc sufficient to develop the radius upon the wheel. Angular faces are formed by clamping the swivel at the required angle and operating the slide by means of the handwheel. The diamond tool is held in the upright post at right angles to the slide.



The New Type Rotor, Giving Increased Power, Is Shown in Cross-Section at the Extreme Right. Beside the cross-section of the former rotor the new governor, at the left, provides constant speeds under load and reduces air consumption

built by the company, as well as in the D-3 grinder illustrated. The new type of rotor, shown in the cross-section sketch, increases materially the power of the machines. It is accurately balanced so that the machine operates without vibration, which pre-

strength. Production savings from the high-speed wheels, as compared to standard wheels, are given by the company as follows: Cast iron, 30 to 50 per cent; malleable iron, 25 to 75 per cent; and brass, bronze and aluminum, 35 to 50 per cent.

Wheel-Truing Attachment for B & S Surface Grinder

FOR accurately shaping the abrasive wheels used on its No. 2 surface grinding machine, the Brown & Sharpe Mfg. Co., Providence, is offering the radius and angular wheel-truing attachment illustrated. The device is particularly useful when grinding lamination dies, flat forming tools and other pieces requiring wheels having radial or angular faces.

The attachment consists of a cast iron base graduated to 90 deg. on either side of zero and carrying a swivel platen. On the latter there is

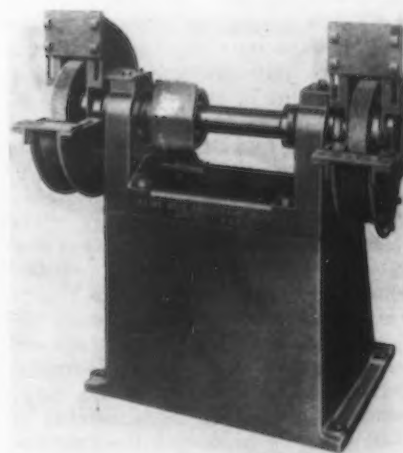
a slide that can be adjusted longitudinally by a handwheel to 64ths of an inch either side of zero. A gib and



Snagging Grinder Operates at 9000 Ft. Per Min.

FOR high-speed rough grinding and snagging the Kling Brothers Engineering Works, 1300 North Kostner Avenue, Chicago, has brought out a double-end grinder designed to use 18-in. rubber bonded or bakelite wheels that operate at 9000 surface ft. per min.

The machine is designated as the type B, and is built in both floor,



The 18-In. Wheels Operate at 9000 Surface Ft. Per Minute. A bench model is also built

stand and bench models. The frame is a semi-steel cored casting. Double-row ball bearings that are entirely inclosed are furnished for the wheel spindles, which are finished all over. Wheel guards are of fabricated steel and are built to conform to the American Engineering Standards Committee's safety code. The driving pulley is rubber covered to prevent belt slippage. Lower grinding costs are attributed to the high wheel speeds and the rugged construction of the machine.

Steel Profits Rise with Volume

Earnings of Steel Corporation and Bethlehem in 1928 Improved Substantially in Spite of Lower Prices

WITH a demand for iron and steel products during 1928 which permitted operations to be maintained with a fair degree of evenness and efficiency, the net profits available for dividend payments of the United States Steel Corporation increased nearly 30 per cent over the preceding year. According to the Corporation's annual report, which has just been issued, this improvement was made possible largely by the increase in production as compared with the previous year and was brought about in spite of a downward tendency in prices which continued, particularly in the first half of 1928. As compared with 1926, however, the Corporation's net profits last year showed a decline of 2.1 per cent, the totals in the three years having been \$114,173,775 in 1928, \$87,896,836 in 1927 and \$116,667,405 in 1926.

Operations Satisfactory

During 1928, according to the report, the mills of the subsidiary companies operated at an average of 83.4 per cent of capacity, in comparison with an average of 78.9 per cent in the preceding year. In 1926 however, the year's operations averaged 88 per cent of capacity. Operations during 1928 were quite uniform, having been 86.7 per cent in the first quarter, 83 per cent in the second, 82.2 per cent in the third and 81.7 per cent in the last quarter. But this slight downward tendency in operations has been checked in the present quarter. "The steady influx of new business covered by contracts and ordered entered which prevailed during 1928," says the report, "has continued since the close of the year and the tonnage entered during January and February, 1929, has fully equalled the large tonnages booked in those months of 1928. Operations during the first two months of 1929 averaged 90 per cent of capacity." This is a considerable improvement over the corresponding period of the preceding year, but it seems hardly likely that operations this month will bring the average for the quarter up to the 94 per cent operating rate, which prevailed during the first quarter of 1926.

Prices Continued Downward

"Notwithstanding the improvement in business for the year," the report continues, "as compared with 1927, the prices secured averaged less than those obtained during 1927, although they were very close to those which prevailed in the closing months of that year. Prices during 1928 were

fairly well maintained, but not appreciably above the low point reached in 1927. For the entire year 1928 the average selling price received for total rolled and other finished products shipped, as compared with the price received in 1927 for an equal tonnage of similar products respectively, netted \$1.38 per ton less for domestic and \$2.48 a ton less for export shipments." These average reductions in per-ton selling prices extended against the total tonnage shipped in 1928 represent an aggregate decrease in gross sales proceeds of approximately \$20,700,000. Similar reductions have taken place in the preceding three years, the figures having been \$2.38 for domestic shipments and 81c. for export in 1927, \$1.12 in domestic and \$2.82 in export in 1926 and \$3.80 and \$4.38 respectively in 1925. Thus the average price decline over the last four years has amounted to \$8.68 a ton in domestic shipments and \$10.49 a ton in export business.

Commenting on this situation, the

report says: "These conditions of high production with diminishing prices reflect the substantial excess producing capacity in the industry. While the operations of the properties of the Corporation show a fair, but not fully commensurate, profit return on the investment employed, these results are due largely to foresight in devoting a liberal portion of surplus and reserves to improving and establishing the plants and facilities on a more efficient basis of operation, thus economizing in cost of production and in that way countering substantially the effect upon earnings of the downward trend of selling prices. The reasonable prices charged for iron and steel products have undoubtedly stimulated consumption to a material extent, thereby enabling the plants to maintain satisfactory operations. In this the public is well served."

Increases in Output and Shipments

Increases in output during 1928 as compared with 1927 were general in all the principal classes of materials

Table I—Production in 1928 and 1927

Products	1928 Tons	1927 Tons	1928 Increase	
			Tons	Per Cent
Ores mined.....	26,633,554	25,646,927	986,627	3.8
Limestone quarried (includes dolomite and fluorspar).....	14,600,181 (a)	4,656,150	9,944,031	213.6
Coal mined.....	28,691,024	27,430,329	1,260,695	4.6
Bee-hive coke.....	448,378	1,815,910	1,367,532*	75.3
By-products coke.....	15,544,995	12,691,070	2,853,925	22.5
Pig iron.....	15,077,527	13,631,498	1,446,029	10.6
Spiegel, ferromanganese and ferro-silicon.....	160,190	152,728	7,462	4.9
Bessemer ingots.....	3,989,400	3,706,404	282,996	7.6
Open-hearth ingots.....	16,116,349	14,780,040	1,336,309	9.0
Rolled and finished steel products:				
Steel rails (heavy and light tee and girder).....	1,366,324	1,482,353	116,029*	7.8
Blooms, billets, slabs, sheet and tinplate bars.....	899,309	758,847	140,462	18.5
Plates.....	1,481,269	1,423,277	57,992	4.1
Heavy structural shapes.....	1,075,045	929,175	145,870	15.7
Merchant bars, hoops, skelp, light shapes, etc.....	2,957,518	2,426,363	531,155	21.9
Tubing and pipe.....	1,431,434	1,625,994	194,560*	12.0
Wire rods.....	228,745	177,770	50,975	28.7
Wire and wire products.....	1,339,623	1,259,907	79,716	6.3
Sheets (black and galvanized) and tinplates.....	1,945,551	1,645,358	300,193	18.2
Finished structural work.....	578,782	553,988	24,794	4.5
Angle splice bars and all other rail joints.....	250,401	273,916	23,515*	8.6
Spikes, bolts, nuts and rivets.....	71,765	63,987	7,778	12.2
Axles.....	39,076	50,379	11,303*	22.4
Steel car wheels.....	60,937	74,898	13,961*	18.6
Sundry steel and iron products.....	246,609	233,070	13,539	5.8
Total.....	13,972,388	12,979,282	993,106	7.7
Miscellaneous products:				
Zinc.....	73,518	75,074	1,556*	2.1
Sulphate of iron.....	35,269	34,260	1,009	2.9
Fertilizer—basic slag.....	21,186	11,639	9,547	32.0
Fertilizer—sulphate of ammonia.....	243,648	193,434	50,214	26.0
Ammonia (as liquor).....	462	709	247*	34.8
Benzol products.....	221,662	169,603	52,059	30.7
Universal Portland cement (bbl.).....	14,957,000	15,425,000	468,000*	3.0

(a) Increase in 1928 due largely to inclusion of production of Michigan Limestone & Chemical Co., whose operations were not previously embraced in this consolidated report.

*Decrease.

produced except cement. Incidentally the exact reverse was true in 1927 as compared with 1926. Production of steel ingots and castings during 1928 amounted to 20,105,749 tons as compared with 18,486,444 tons in 1927 and with 20,306,668 tons in 1926. The 1928 increase over 1927 was not so large comparatively as the increase in the country's total output. Estimating the 1928 production of all steel ingots and castings in the country at 51,500,000 tons, the production of the Steel Corporation amounted to only 39 per cent, as compared with 41.14 per cent in 1927 and with 42.05 per cent in 1926. As shown in the accompanying chart, this decrease in percentage of the total has been going on with only one or two interruptions since the formation of the Steel Corporation in 1901, when its percentage of the total ingot and castings production of the country was 66.3.

In the production of all rolled and finished products the increase in 1928 as compared with 1927 amounted to 993,106 tons, or 7.7 per cent. The increase was general in all products except tubing and pipe, in which there was a decrease of 12 per cent, and in materials supplied to railroads such as rails, angle splice bars and other rail joints and axles and steel car wheels, in all of which there was a substantial reduction. Detailed production figures are shown in Table I.

In shipments the most outstanding increases were shown in raw materials, under the classification, pig iron, ingots, ferroalloys and scrap. Domestic shipments of these products increased 31.39 per cent over the preceding year, while export shipments increased from 6790 tons in 1927 to 45,493 tons in 1928, an improvement of 570 per cent. Detailed comparisons of shipments may be found in Table II.

The total value of business transacted by all subsidiary companies during the year was \$1,374,443,433, compared with \$1,310,392,861 in the preceding year and with \$1,508,076,090 in 1926. Of the 1928 total, \$912,575,768 resulted from sales of manufacturing, iron ore, limestone and coal and coke companies, while \$337,332,803 was accounted for by sales between the subsidiary companies. In 1927 the corresponding figures were \$870,235,942 and \$319,445,504. The remainder of gross receipts from business was accounted for by the transportation and miscellaneous companies.

Capital Expenditures

Expenditures made by the corporation and its subsidiaries during 1928 for additional property, new plants, extensions and improvement, less credits for salvage and also for net reduction in lock-up in advanced charges for stripping and development work at mines amounted to \$51,570,108. The greater part of this sum, or \$35,232,517, was taken by manufacturing properties, while \$4,539,634 went into limestone and flux properties and included the original purchase cost of a large part of the

Table II—Foreign and Domestic Shipments and Business

	1928 Tons	1927 Tons	Increase or Decrease	
			Tons	Per Cent
Domestic Shipments				
Rolled and finished steel products..	12,700,556	11,859,548	841,008	7.09 Inc.
Pig iron, ingots, ferro and scrap....	299,603	228,028	71,575	31.39 Inc.
Coal, coke, iron ore and limestone..	4,282,412	564,814	3,717,598	See note
Sundry materials and by-products..	161,224	129,688	31,536	24.32 Inc.
Total tons all kinds of materials, except cement.....	17,443,795	12,782,078	4,661,717	See note
Universal Portland cement (bbl.)...	14,555,064	15,261,966	706,902	4.63 Dec.
Export Shipments				
Rolled and finished steel products..	1,272,573	1,133,735	138,838	12.25 Inc.
Pig iron, ferro and scrap.....	45,493	6,790	38,703	570.00 Inc.
Sundry materials and by-products..	153,488	145,571	7,917	5.44 Inc.
Total tons all kinds of materials..	1,471,554	1,286,096	185,458	14.42 Inc.
Aggregate tonnage of rolled and finished steel products shipped to both domestic and export trade	13,973,129	12,993,283	979,846	7.54 Inc.
Total value of business (covering all of above shipments, including cement, railroad and marine equipment delivered and other business not measured by the ton unit)				
Domestic (not including inter-company sales)	\$821,558,132	\$784,453,995	\$37,104,137	4.73 Inc.
Export	91,017,636	85,781,947	5,235,689	6.10 Inc.
Total	\$912,575,768	\$870,235,942	\$42,339,826	4.87 Inc.

(NOTE—This increase is due largely to the inclusion in 1928 of the Michigan Limestone & Chemical Co., whose operations were not embraced previously in this consolidated report.)

stock of the Michigan Limestone & Chemical Co. In 1927 expenditures for plant betterments totaled \$97,585,998, of which \$64,368,107 went into the manufacturing properties. In 1927 a large amount, \$15,466,896, was required by the coke plants and included a gas line from the Clairton, Pa., ovens to the Pittsburgh district. Last year the expenditures on the coke properties amounted to only \$2,789,869.

Commenting upon the capital out-

lay during the year, the report says: "In continuation of the policy steadily observed by the corporation of concentrating the operations of the subsidiary manufacturing companies at fewer locations, a number of high cost and obsolete plants were abandoned during the year. Energetic efforts are being made to dispose of, by sale, the real estate occupied by these abandoned plants. Substantial progress was made in this direction during the year. The abandonment of

Table III—Comparative Income Account for the Fiscal Years ended Dec. 31, 1928 and 1927

	1928	1927	+ Increase — Decrease
Earnings—Before charging interest on bonds and mortgages of subsidiary companies:			
First quarter.....	\$42,884,056	\$47,610,345	— \$4,726,289
Second quarter.....	48,874,819	48,055,635	+ 819,184
Third quarter.....	54,049,215	43,355,092	+ 10,694,123
Fourth quarter.....	55,178,209	33,294,417	+ 21,883,792
Total for year.....	*\$200,986,299	*\$172,315,489	+ \$28,670,810
Less, interest on outstanding bonds and mortgages of subsidiary companies..	7,681,372	7,991,113	— 309,741
Balance of earnings.....	\$193,304,927	\$164,324,376	+ \$28,980,551
Less, charges and allowances for depletion, depreciation and amortization applied as follows:			
To depletion and depreciation reserves of subsidiary companies.....	\$55,621,495	\$47,390,339	+ \$8,231,156
To sinking funds on United States Steel Corporation bonds.....	11,615,808	11,515,669	+ 100,140
Net income in the year.....	\$126,067,624	\$105,418,368	+ \$20,649,255
Deduct:			
Interest on United States Steel Corporation bonds outstanding.....	16,106,573	16,674,176	— 567,603
Premium paid on bonds redeemed:			
On subsidiary companies bonds.....	405,894	320,215	+ 85,679
On United States Steel Corporation bonds	1,552,170	1,078,000	+ 474,170
Balance	\$108,002,987	\$87,345,978	+ \$20,657,009
Add: Special income receipts for the year, including adjustments of various accounts	6,170,788	550,858	+ 5,619,930
	\$114,173,775	\$87,896,836	+ \$26,276,939
Dividends on United States Steel Corporation stocks:			
Preferred, 7 per cent.....	25,219,677	25,219,677	.....
Common, 7 per cent.....	49,813,645	49,813,645	.....
Surplus net income.....	\$39,140,453	\$12,863,514	+ \$26,276,939

*Balance of earnings after making allowances for estimated amount of Federal income taxes.

these older and smaller plants, nearly all of which were not self-contained either as to supply of raw steel required for finishing facilities, has in no way diminished the producing capacity of the subsidiaries, as new plants or new facilities at other plants, all of most modern type and efficiency, have been constructed or installed in anticipation of the early passing of these plants. The investment cost in the properties abandoned, other than the real estate, has been fully charged off against depreciation reserves provided from earnings and income."

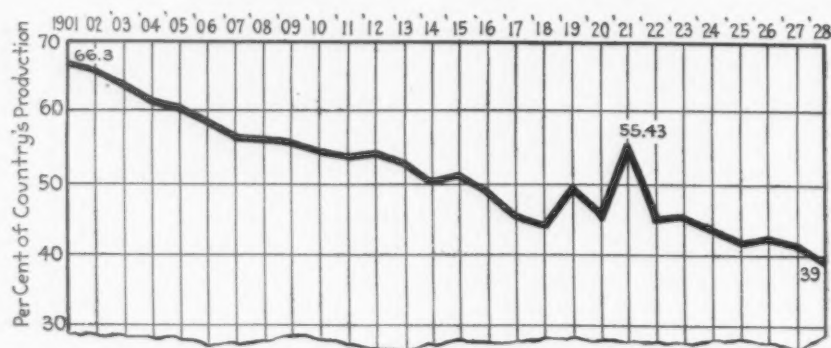
Among the important improvements in operating efficiency which were made during the year were those relating to pipe manufacture. At the McKeesport, Pa., works of the National Tube Co., work was commenced on the modernizing of the plant, covering installation of an open-hearth furnace plant to substitute open-hearth steel for a portion of the Bessemer steel capacity and to substitute seamless pipe mills for a substantial part of the existing lap-weld mills, rapidly becoming obsolete. This work will not increase the productive capacity of steel for sale, but provide modern facilities and equipment for economically producing pipe and tubes of a type "which has been displacing lap-weld in the trade." At the Lorain, Ohio, works of this company there was authorized near the close of the year the converting of the No. 6 lap-weld pipe mill into a seamless pipe mill, "this being a part of the program for substituting seamless for lap-weld pipe." Mention was made in THE IRON AGE, Jan. 3, 1929, page 84, of other important plant additions and betterments for which expenditures were made in 1928.

Large expenditures for plant improvement will also be made in 1929 about which the report has the following to say: "At the close of 1928 the balance unexpended on authorized appropriations of the subsidiary companies for extensions, additions and improvements, including the 1929 budget for stripping and development

work at mines, totalled \$73,626,000. It is estimated that about \$50,000,000 of this will be expended in 1929. A recent survey of the properties of the manufacturing subsidiaries, made with the view of forecasting the probable amount which should be out-laid in the next three years for rehabilitating and modernizing a number of the departments and extending the finishing facilities of others (but not contemplating any extension in total steel production), indicates that substantial additional expenditures will be necessary. At the date of

ments amounted to \$39,140,453. There was also added to surplus during the year \$36,705,076 derived from "Federal income and excess profits tax refunds and reserves no longer required," and \$8,091,983, representing "surplus earned in prior years applicable to United States Steel Corporation's investment in stocks of controlled companies whose assets and liabilities were not included in previous consolidated reports."

During the year \$6,500,000 was appropriated from surplus for "addition to depreciation reserves for general



Percentage of the Country's Total Output of Steel Ingots and Castings Produced by the United States Steel Corporation

writing of this report complete analysis and consideration of the details of the survey have not been concluded. But it can safely be stated that upon conclusion of such review the amount to be required for capital expenditures in 1929 above mentioned, on basis of appropriations already formally authorized, will be necessarily increased."

Expenditures and appropriation from earnings for maintenance, depletion, depreciation and amortization amounted to \$173,821,056 in 1928, compared with \$172,781,272 in 1926. Ordinary repairs and maintenance of manufacturing plants took \$106,127,890 in 1928, as compared with \$117,540,174 in the preceding year.

As shown by the comparative income account in Table III, surplus net income in 1928 after all dividend pay-

obsolescence and adjustment of prior years depreciation accruals" and \$30,205,076 to "account for amortization of appreciated cost to United States Steel Corporation of its investment in capital stocks of subsidiary companies in excess of their investment in tangible property." With these adjustments total undivided surplus at Dec. 31, 1928, stood at \$410,277,349, as compared with \$363,044,914 one year before.

Decrease in Employees

The average number of employees during 1928 totaled 221,702, compared with 231,549 in the preceding year, a decrease of 4.25 per cent, and a further decrease from the 253,199 men employed in 1926. Manufacturing properties required 160,524 employees in 1928 and 167,405 in 1927. Total wages and salaries paid in 1928 aggregated \$413,699,720, as against \$430,727,095 in the preceding year, and resulting in an average daily earnings per employee, exclusive of general administrative and selling forces, of \$5.85 in 1928 and \$5.86 in 1927. Including the administrative and selling forces the average daily earnings per employee were \$6 and \$5.99 respectively.

Bethlehem Profits Up

NET income in 1928 of the Bethlehem Steel Corporation, after providing for depreciation, depletion and other charges, amounted to \$18,585,922, an increase of 17.4 per cent over the \$15,826,142 earned in the previous year, but a decrease from the \$20,246,167 reported in 1926. The rate of operation in 1928, however, was ahead of 1927 and 1926, the average

(Concluded on page 854)

Table IV—Inventories

	Dec. 31, 1928	Dec. 31, 1927
Ores—Iron, manganese and zinc.....	\$71,147,894	\$80,099,036
Limestones, fluxes and refractories.....	4,470,900	5,686,874
Coal, coke and other fuel.....	9,981,972	12,414,147
Pig iron, scrap, ferro and spiegel.....	21,648,897	23,649,267
Pig tin, lead, spelter, copper, nickel, aluminum and dross and skimmings.....	9,280,860	10,291,340
Rolls, molds, stools, annealing boxes, etc.....	12,713,279	14,591,359
Ingots—Steel.....	1,778,612	1,513,534
Blooms, billets, slabs, sheet and tinplate bars, etc.....	22,639,424	21,803,436
Wire rods.....	1,502,533	1,617,466
Skelp.....	1,594,321	1,971,460
Finished products.....	63,894,798	65,112,328
Manufacturing supplies, stores and sundry items not otherwise classified.....	29,875,045	31,003,952
Mining supplies and stores (for ore and coal properties).....	3,853,582	4,968,476
Transportation companies' supplies and stores.....	5,579,938	5,971,851
Merchandise of supply companies.....	1,677,301	1,691,169
Material, labor and expense locked up in uncompleted bridge, structural and other contract work.....	\$41,986,477	
Less bills rendered on account.....	38,168,613	
Stocks abroad and on consignment.....	3,817,864	3,175,001
Material in transit.....	25,092,122	28,863,576
	6,291,858	4,759,388
Total.....	\$296,841,200	\$319,183,660
Less, inventory reserve.....	47,076,404	48,015,658
Balance.....	\$249,764,796	\$271,168,002

British Steel Consumers Buy At Home

Mills Profit by High Market and Delayed Deliveries on Continent

—Germans Form Institute to Study Copper Substitutes

(By Cable)

LONDON, ENGLAND, March 18.

EXPORT demand for coal is strong and collieries are operating full. Pig iron is quieter and a lull in demand would not be unexpected, following the good tonnage placed recently. Very little iron is available for sale in the open market as steel company producers are using the bulk of their own product. More furnaces are to be blown in this month and stocks are negligible.

Hematite iron is in active demand and makers are sold up until June. Tees pig iron exports are improving, especially to Italy. Some good export orders have been placed for East Coast hematite for April-May shipment.

Finished steel demand is better and a South African railroad has bought 6000 tons of rails and is inquiring for plates and sheets. Some important business is pending in plates and shapes with the Far East, but the makers' export committee is reticent.

Shipbuilding specifications are coming out more freely now that the severe winter weather is ended. Prices are firm with an upward tendency as a result of increasing costs.

Welsh sheet bar makers have increased prices 3s. 9d. (90c.) per ton and the market is firm. Tin plate makers are now asking 18s. 3d. (\$4.42) per base box, f.o.b. works port and with the quota plan now operating order books are well filled.

Domestic and export inquiries are increasing with promise of some good future business.

Galvanized sheets are dull. Japanese demand for black sheets is light, but the Continent and South American markets are inquiring.

The English Steel Corporation has been registered, with capital stock of £8,000,000 (\$38,800,000), consisting of £2,000,000 of 7 per cent cumulative preferred stock and £6,000,000 of common stock. The new corporation will acquire various steel interests from Vickers, Armstrong, Vickers, Ltd., and Cammell, Laird & Co. John Brown & Co., Ltd., and Thomas Firth & Sons, both of Sheffield, have joined the new corporation.

February exports of pig iron were 38,700 gross tons, of which the United States received 4700 tons. Total iron and steel exports were 380,000 tons. Imports of Continental iron and steel

in February totaled only 160,000 tons because of high prices and frozen traffic conditions.

Business in Continental material here has been quiet. The International Steel Cartel has increased the annual production of all members by 2,000,000 tons, members' respective percentages of the total remaining unchanged. The German export quota has been raised to 330,000 tons a month, from the former maximum of 300,000 tons. The European Rail Makers' Association is considering advancing prices on rails for the Far East by 2s. 6d. (60c.) to £6 10s. (\$31.52) per ton and to £6 12s. 6d. (\$32.12) per ton, c.i.f. Antwerp for other overseas countries. The European price would be raised to £6 15s. (\$32.73) per ton.

French production in January was 905,000 tons of pig iron and 837,000 tons of raw steel.

British Steel Mills Are Busy

Higher Continental Market Drives British Buyers Back to Their Own Mills—Pig Iron Exports Good

LONDON, ENGLAND, March 5.—Since the beginning of the year the iron and steel markets here have undergone considerable change. Rising costs of production and higher prices on the Continent have caused British

consumers to place an increasing volume of orders with their own mills. Meanwhile British fuel prices have been rising, and both pig iron and steel products have been advanced. Despite higher prices, British mak-

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works with American equivalent figured at \$4.85 per £ as follows:

Durham coke, del'd.	£0 18½s. to £0 19s.	\$4.48 to \$4.60
Bilbao Rubio ore*	1 3	6.18
Cleveland No. 1 foundry	3 9½	16.85
Cleveland No. 3 foundry	3 7	16.25
Cleveland No. 4 foundry	3 6	16.00
Cleveland No. 4 forge	3 5½	15.88
Cleveland basic (nom.)	3 5	15.76
East Coast mixed	3 13½	17.82
East Coast hematite	3 14	17.94
Rails, 60 lb. and up	7 15 to 8 15	37.59 to 42.43
Billets	6 7½ to 7 0	31.92 to 33.95
Ferromanganese	13 15	66.69
Ferromanganese (export)	13 10 to 14 0	65.47 to 67.90
Sheet and tin plate bars, Welsh	6 6¼	30.61
Tin plate, base box	0 18½ to 0 18¼	4.40 to 4.43
Black sheets, Japanese specifications	13 7½	64.87
Ship plates	7 12½ to 8 2½	1.66 to 1.76
Boiler plates	9 0 to 10 10	1.95 to 2.27
Tees	8 2½ to 8 12½	1.76 to 1.86
Channels	7 7½ to 7 17½	1.60 to 1.71
Beams	7 2½ to 7 12½	1.55 to 1.65
Round bars, ¾ to 3 in.	7 15 to 8 5	1.67 to 1.78
Steel hoops	9 0 to 10 0	1.95 to 2.16
Black sheets, 24 gage	10 0	2.16
Galv. sheets, 24 gage	13 10	2.92
Cold rolled steel strip, 20 gage (nom.)	12 0	2.64

*Ex-ship, Tees, nominal.
(a) Nominal.

Continental Prices All F.O.B. Channel Ports

(Per Metric Ton)

Foundry pig iron (a):	£3 6s. to £3 10s.	\$16.00 to \$16.97
Belgium	3 6	16.00 to 16.97
France	3 6	16.00 to 16.97
Luxemburg	3 6	16.00 to 16.97
Basic pig iron (a):	3 6	16.00
Belgium	3 6	16.00
France	3 6	16.00
Luxemburg	3 6	16.00
Coke	0 18	4.37
Billets:		
Belgium	5 7	25.94
France	5 7	25.94
Merchant bars:		C. per Lb.
Belgium	6 3 to 6 5	1.34 to 1.36
France	6 3 to 6 5	1.34 to 1.36
Luxemburg	6 3 to 6 5	1.34 to 1.36
Joists (beams):		
Belgium	5 3 to 5 4	1.13 to 1.14
France	5 3 to 5 4	1.13 to 1.14
Luxemburg	5 3 to 5 4	1.13 to 1.14
Angles:		
Belgium	6 0 to 6 2	1.31 to 1.32
¼-in. plate:		
Belgium (a)	6 11	1.43
Germany (a)	6 11	1.43
¾-in. ship plate:		
Belgium	6 5½	1.37
Luxemburg	6 5½	1.37
Sheets, heavy:		
Belgium	6 1	1.31
Germany	6 1	1.31

ers of pig iron have full order books and their stocks are negligible. The shortage of available supplies of pig iron could be relieved by blowing in more furnaces, but producers are as yet unwilling to add materially to present output. The shortage of hematite iron is not severe, and furnaces have sold some sizable tonnages for export, especially to Italy.

Practically all current British requirements in semi-finished steel are being placed domestically, as Continental prices are high and the recent severe weather has caused long delays in deliveries. Competition in finished products is still keen in foreign markets, but European mills are offering little competition in the United Kingdom.

The forthcoming general election is being awaited by iron and steel producers with considerable interest. Supporters of protection for iron and steel are still making strong efforts to have a "safeguarding" plank included in the platform of the party at present in power, but the most that the Premier will promise is to permit the iron and steel trade to make an application for safeguarding. The problem of protection is difficult, as it is almost impossible to draw a line of demarcation between raw materials and manufactured products that will be satisfactory to the industry as a whole.

British and Germans to Try to Standardize Bolts

HAMBURG, GERMANY, Feb. 23.—British and German bolt manufacturers are expected to appoint a committee on standardization some time this spring. The committee will investigate the possibility of reducing the number of sizes of bolts and nuts and standardizing the threads. At present there are four different threads in use, "Whitworth" (British), "National" (American), "Old Westphalian" (German) and the "Millimeter." These various types of threads are not limited to particular countries, all four being in use in Germany, with the "Millimeter" predominant. Although the "Whitworth" thread is predominant in Britain, other threads are imported and a similar situation prevails in various Continental countries.

Such a range of standard threads results in numerous misunderstandings and claims in the export trade. In addition, various European producers make hexagonal and carriage bolts and nuts of different standard sizes. The British standard sizes for bolts differ from the German in that the heads are thicker. French makers produce a different type, and the Belgians also. An effort will be made by the committee to eliminate some of the various European sizes and types and substitute a uniform European bolt and nut standard. In many quarters it is considered doubtful whether the plan will be entirely successful, as each producer has certain specialties. Practically all previous nego-

tiations to establish European standards for other products have been unsuccessful.

New Steel Plant in Spain—More Expansion Planned

MADRID, SPAIN, March 2.—A new plant with three 70-ton open-hearth furnaces has just been put in production by the Sociedad Altos Hornos de Viscaya of Bilbao, one of the largest steel producers in Spain. The plant was constructed by the Central German Steel Works and the Siemens Schuckert A. G. of Berlin, and the open-hearth furnaces were furnished by Otto Maetz, Breslau, Silesia. The Compania Siderurgica del Mediterraneo, at Sagunto, has contracted for two 80-ton open-hearth furnaces, and there are other steel companies inquiring for additional equipment to increase their steel production.

German Steel Mills Await American Tariff

HAMBURG, GERMANY, March 1.—Mills show little interest in orders offered by American importers for forward delivery, preferring to await more definite knowledge of what is to be expected in tariff revision at Washington. It is pointed out that an advance in the American tariff usually results in numerous cancellations of contracts. Some orders for structural steel, hot-rolled hoops and other steel products for shipment during the summer have been rejected, although advanced prices in the United States have brought an increase in inquiry.

German Cutlery Workers Migrate to America

HAMBURG, GERMANY, March 2.—According to statistics gathered by the Solingen cutlery industry, a total of 384 skilled cutlery workers left Solingen and Ohligs, the centers of the industry, in 1927 and 1928, to take employment in American cutlery plants. Since the Armistice some 1200 skilled cutlery makers have left the German industry and emigrated to the United States. Since 1924, according to recently published statistics, 11,910 skilled steel workers have left plants in Germany producing alloy steel, wire and electric steel and have emigrated to the United States.

Japanese Steel Mills Report Profitable Year

WASHINGTON, March 12.—For the first time since the depression of 1920, Japanese steel manufacturers in the Kobe-Osaka district have reported a profitable year, according to the Department of Commerce. Prices last year advanced, and a domestic sales agreement was entered into by the Kanto and Kansai manufacturers to prevent price cutting.

"While the favorable year was largely due to exterior circumstances which influenced local market prices, due credit must also be given to the mills themselves, which, by constant endeavor to improve their productive processes, have greatly reduced their costs of operation during recent years and have placed themselves in a position to compete in the world's market," said the statement. "The mills, however, continue to be handicapped in this region by the lack of sufficient supplies of iron ore and coking coal."

German Institute to Study Copper Substitutes

HAMBURG, GERMANY, March 1.—Large copper consumers in the electrical and other industries plan to establish a special research institute, which will attempt to find satisfactory substitutes for copper. It is pointed out that wide fluctuations in the price of copper and the high market at present have made such an organization necessary. During the war, when German industry was isolated from supplies of copper, such an institute functioned successfully, but it was dissolved in 1919. The new research organization is expected to investigate the possibilities of rustless iron as a substitute for copper in many uses.

French Plant Installs 11 Electric Furnaces

BORDEAUX, FRANCE, Feb. 26.—The Société des Acieries de Firminy recently installed 11 electric furnaces in its works at Saint Chely d'Apcher in La Lozere. The furnaces, consisting of 10 single-phase, using 1000 kw. each, and one three-phase, using 1500 kw., will be operated on the 50,000,000 kwhr. annually available from the hydroelectric plants at d'Albaret le Comtal and Malzieu. It is planned to produce annually about 5000 tons of malleable pig iron, 3000 tons of ferro-silicon, 2200 tons of spiegeleisen, 3200 tons of ferromanganese and a small tonnage of ferrochromium.

Year's Motor Car Output of German Maker Sold

HAMBURG, GERMANY, March 2.—The rapid improvement of the motor car industry in Germany is illustrated in the recent report of the Opel A. G., the largest German maker of low-priced automobiles. The manufacturing program of this company for 1929 calls for an output of 100,000 cars, and the larger part of this total has already been sold. Production of the Opel company has increased from 14,000 automobiles in 1925 to 80,000 in 1928. Three years ago the small Opel roadster of 20 hp. was sold at 4600 m. (\$1,090), f.o.b., but the price has been reduced this year to 2200 m. (\$521.40).

Many Changes in Tariff Proposed

American Iron and Steel Institute Recommends Some Higher Duties, Also Revised Phraseology—Free Manganese Ore and \$3 Levy on Pig Iron Among Proposals

WASHINGTON, March 19. — The American Iron and Steel Institute, through its special tariff representative, Thomas J. Doherty of New York, on Monday filed with the Ways and Means Committee of the House of Representatives a voluminous amendment to its prior briefs on suggested changes in the metal schedule of the Fordney-McCumber tariff act, which the Ways and Means Committee and its sub-committees are now revising with the expectation of presenting the bill to Congress on April 20 at its special session.

The brief takes up the metal schedule, as it relates to ferrous metals, alloys and raw materials, paragraph by paragraph, and suggests not only changes in some of the rates of duty, but changes in phraseology for the purpose of clarification. In a letter accompanying the brief the institute says:

"The changes here requested are made necessary for the most part:

"1. By decisions of the customs tribunals whereby the evident intent of the lawmakers of the Sixty-seventh Congress was frustrated.

"2. By the introduction into commerce of commodities that either did not exist or were of no commercial importance when the tariff act of 1922 was enacted.

"3. For the purpose of removing the temptation to further litigation by imposing the same, or approximately the same rates of duty, upon the same or approximately the same classes of products, notwithstanding that they are known by differing names.

"4. For the purpose of meeting changed economic conditions in respect to certain products as compared with the conditions obtaining at the time the tariff act of 1922 was enacted.

"The suggestions herein offered are strictly within the scope of the term, 'Tariff Readjustment—1929,' which the Committee on Ways and Means has selected to describe its present activities. No sweeping changes are here asked and no extreme increases of duty are advocated.

"It is a matter of common knowledge that certain regions of the United States are exempt from foreign competition in respect to iron and steel products because of their distance from the coasts and the consequent heavy freight charges. As to such localities, the presence or absence of a tariff duty is equally unimportant. It is also a matter of com-

mon knowledge, however, that the great producing and consuming markets are so located that the pressure of foreign competition, made possible by low costs and low ocean freight rates, bears heavily upon them, and the industries so located are entitled to that protection which it has been the aim of all Republican tariff acts to extend."

The important changes proposed are scheduled in brief in an accompanying box, while details of these suggestions and the reasons therefor are given in the paragraphs which follow.

Reclassification and Higher Duty for Concrete Bars and Piling

One paragraph of the present act which has given rise to considerable litigation is 312, which applies to "beams, girders, joists, angles, channels, car-truck channels, tees, columns and posts, or parts of sections of columns and posts, deck and bulb beams and building forms, together with all other structural shapes of iron and steel not assembled, manufactured or advanced beyond hammering, rolling or casting." It was under this paragraph that concrete reinforcing bars and sheet steel piling were admitted by decisions of the Court of Customs Appeals as "building forms" and thereby taking a low duty of 1/5 of 1c. per lb. The institute proposes that concrete reinforcing bars and sheet steel piling be specifically mentioned in paragraph 304, taking a duty of 1/5 of 1c. per lb. under the present law, but taking 3/10 of 1c. or higher, according to valuation, if the recommendations of the institute are enacted.

The fundamental vice of paragraph 312, the institute brief says, is that the terms "building forms" and "structural shapes" are loose and indefinite, so much so that "there is grave danger that other articles than those above named will eventually be classified thereunder unless the law is amended. It is a serious error to have a basket or residuary clause in a schedule at the lowest rate of duty named in that schedule, for it is a constant temptation to importers and their attorneys to try to have their products classified under such basket or residuary clause.

"It is suggested in the interest of good administration and for the avoidance of further litigation that the phrases, 'building forms' and 'structural shapes' be omitted from

the paragraph, leaving therein only the particular articles that are mentioned by name. The effect of this will be to relegate bars and shapes to paragraph 304, where they belong and where they are made dutiable according to their value." It is also suggested by the institute that the paragraph be worded so that it will exclude small articles that are really hardware.

Suggested changes in rates of duty under paragraph 312 are an increase from 1/5 of 1c. per lb. to 1/2 of 1c. per lb. on the items listed in the lower bracket, while if any of these articles are machined, drilled, punched, assembled or otherwise in an advanced stage of manufacture, a duty of 1c. per lb. is proposed in place of the present 20 per cent ad valorem duty, with the exception that on sashes, frames and similar building forms of steel the present duty of 25 per cent ad valorem be increased to 35 per cent.

Higher Duty Wanted on Cotton Ties, Bands, Strips, Etc.

Cotton ties and other forms of hoop and band steel and strips are also on the institute's list of articles which should have greater tariff protection. The proposed increase on cotton ties is from one-fourth of 1c. per lb. to four-tenths of 1c. With respect to this commodity, the brief says:

"Cotton ties are imported very heavily. During the cotton tie season just ended more than 1,000,000 bundles of foreign cotton ties were sold in competition with American cotton ties at a very much lower price than it was possible for American producers to make. The total consumption was between 2,000,000 and 3,000,000 bundles. Under the present law, the duty on cotton ties is less than that imposed upon the material from which they are made. Nevertheless, a small increase of duty only is suggested, namely, to 4/10 of 1c. per lb. This would impose no burden upon the cotton farmer, for he receives for his cotton ties the same price as he gets for his cotton. In other words, the bale of cotton is sold upon its total gross weight, which includes six ties weighing 9 lb. and burlap covering weighing approximately 13 lb., at the price per pound of cotton."

The increases proposed for hoop and band steel, other than cotton ties, are as follows: Thinner than 3/8 and not thinner than 109/1000 of 1 in., from 1/4 of 1c. to 5/10 of 1c.; thinner

than 109/1000 of 1 in. and not thinner than 38/1000 of 1 in., from 35/100 of 1c. to 6/10 of 1c.; thinner than 38/1000 of 1 in., from 55/100 of 1c. per lb. to 9/10 of 1c. On strips not specially provided for, an increase from 25 per cent to 35 per cent ad valorem is proposed.

Wire Changes Advocated

Numerous changes are suggested for paragraphs 315, 316 and 317, relating to wire rods and finished wire products. It is proposed that the duty on rods, when valued at not over 4c. per lb., be increased from 3/10 of 1c. per lb. to 4/10 of 1c.; that on values exceeding 4c. per lb. the rate be 35 per cent ad valorem instead of 6/10 of 1c. and that all tempered or treated or partly manufactured pay 1/2 of 1c. per lb. instead of 1/4 of 1c., and that those which have been cold rolled, cold drawn, cold hammered or polished shall pay 1/2 of 1c. per lb. instead of 1/4 of 1c.; also that those which have been cold hammered, brightened, blued or polished to a more perfect surface finish than the grade of cold rolled, smoothed only, shall pay 4/10 of 1c. per lb. instead of 2/10 of 1c.

On iron or steel wire not smaller than 95/1000 of 1 in. in diameter an increase in the present duty of 3/4 of 1c. per lb. to 1c. per lb. is proposed; on wire smaller than 95/1000 and not smaller than 65/1000 of 1 in., now dutiable at 1 1/4c. per lb., an increase to 1 3/4c. per lb. is proposed; on wire smaller than 65/1000 of 1 in., now dutiable at 1 1/2c. per lb., an increase to 2c. per lb. is proposed, while on these products when valued at more than 6c. per lb., an increase from 25 per cent to 35 per cent ad valorem is proposed. Slight increases are also suggested on wire rope and strand, spinning and twisting ring travelers, wire heddles and healds.

On certain sizes of wire fencing a slight increase is asked for and on baling wire an increase from present one-half of 1c. per lb. to three-fourths of 1c. is proposed. It is also suggested that there should be a small duty on barbed wire, which is now on the free list. The duty requested, 2/10 of 1c. per lb., it is stated, is lower than the lowest rate on the wire out of which barbed wire is made.

Nail Reclassification Suggested

A classification of wire nails to conform to present manufacturing and commercial practice is suggested by the institute. An increase is asked on fine wire nails "because the difference in cost of manufacture as compared with the larger nails represents labor. It will do no more than put American-made nails on a parity with the foreign nails laid down at Gulf ports, where the competition from French, German and Belgian products has all but eliminated domestic nails."

The suggested changes are that cut nails and cut spikes exceeding 2 in. in length (now dutiable at 4/10 of 1c. per lb.) cut tacks and brads, etc. (now dutiable at 15 per cent) and horse-shoe nails and other nails not special-

ly provided for (now dutiable at 1 1/2c. per lb.) be bracketed at the rate of 5/10 of 1c. per lb.; also that the present rate of 4/10 of 1c. per lb. on nails, etc., not less than 1 in. long nor smaller than 65/1000 of 1 in. in diameter be applied to nails, etc., not less than 1 in. and exceeding 148/1000 of 1 in.; that the present rate of 3/4 of 1c. per lb. on nails, etc., less than 1 in. long and smaller than 65/1000 of 1 in. in diameter be applied to nails, etc., not less than 1 in. long, 72/1000 of 1 in. or more in diameter, but not exceeding 148/1000 of 1 in. It is proposed that nails and allied products less than 1 in. long and less than 72/1000 of 1 in. in diameter be assessed at 1 1/2c. per lb.

Fine Steels Need Greater Protection, Institute Says

An amendment is offered for paragraph 304 to include concrete reinforcing bars and sheet steel piling. Higher rates of duty are also requested on all of the articles mentioned in this paragraph, which include ingots, blooms, slabs, die blocks or blanks; billets and bars whether solid or hollow; shafting, pressed, sheared or stamped shapes; hammer molds or swaged steel; alloys not specially provided for as substitute for steel in the manufacture of tools; sheets and plates and steel not specially provided for, etc. The present duty on these articles when valued at not over 1c. per lb. is 2/10 of 1c. per lb., and when valued above 1c. and not above 1 1/2c. per lb., the duty is 3/10 of 1c. per lb. The institute proposes that these two groupings be bracketed and that the duty be 3/10 of 1c. per lb. for all values up to and including 1 1/2c. per lb. When the value is above 1 1/2c. and not above 2 1/2c. per lb., a duty of 6/10 of 1c. per lb. is proposed instead of 5/10 of 1c. per lb.; when the value is above 2 1/2c. and not above 3 1/2c. per lb. the suggested duty is 1c. per lb. instead of 8/10 of 1c. as at present; for values above 3 1/2c. and not above 5c. per lb. 1 1/2c. per lb. is suggested in place of the present duty of 1c.; for values above 5c. and not above 8c. per lb. the suggested duty is 2.40c. in place of 1.70c.; for values above 8c. and not above 12c. per lb. 3.60c. is suggested in place of 2.50c. per lb.; for values above 12c. and not above 16c. per lb. a duty of 5c. per lb. is proposed in place of 3.50c. If valued above 16c. per lb., an ad valorem duty of 35 per cent is requested in place of the present 20 per cent duty. It is further suggested that the duty on steel circular saw plates be increased from 1/4 of 1c. per lb. to 1/2 of 1c. per lb., and that on hollow bars and hollow drill steel valued at more than 4c. per lb. there shall be levied an additional duty of 2c. per lb.

Says Steel Cannot Be Honestly Invoiced at 1c. Per Lb. or Less

The changes in duties above suggested are for the purpose of giving higher protection on fine steel in which the labor cost is relatively high

and in which the pressure of foreign competition, it is stated, is being increasingly felt. In commenting on its request for a bracketing of the lower valuations, with a minimum duty of 3/10 of 1c. per lb. on values up to 1 1/2c. per lb., the institute says that "it is questionable if steel products can be honestly made, honestly marketed and honestly invoiced at 1c. or less per lb. There is reason to suspect, although for obvious reasons it is not possible to demonstrate it, that such steel is 'dumped.'" It is further stated that the slight increases in the higher brackets are "to make the rates symmetrical in view of the progressive increase in the element of labor involved in the production of the finer steels and because also of the fact that a great proportion of these steels contain one or more of the alloys upon which paragraph 302 levies very heavy duties.

"The importation of these fine grades of steel," says the brief, "is seriously felt by domestic producers of similar products and the foreign steels are enjoying an inordinate share of the market. One of the large users of such steel is in the manufacture of rock drills, and it is not pleasant to have to record that on the vast undertaking of the municipal subway in New York, being built with money taken by taxation from the people of New York, nothing but foreign steel was used in making the drills. Not because the American steel was inferior, but because the foreign steel could, under this low duty, be laid down in New York, duty paid, at much less than the price for which the American steel can be sold."

Alloy Steel Upward Revision Is Proposed

Alloy steels also come in for suggested upward revision of duties. The present law permits the presence of 6/10 of 1 per cent of the alloys named without incurring the additional duty of 8 per cent. This the institute desires to amend by reducing the permissible percentage of alloys to 1/4 of 1 per cent on the ground that "the addition of more than 1/4 of 1 per cent of these alloys, or any of them, imparts new qualities and uses to the steel and transforms it from ordinary carbon steel to alloy steel. On the other hand, 1/4 of 1 per cent is ample to allow for the incidental presence of alloy in steel." The institute suggests that the duty be raised to 20 per cent ad valorem instead of the present 8 per cent. An amending of the phraseology of the paragraph is suggested so that the specific paragraph numbers be inserted to designate more clearly the products to which the alloy duty is to be applied. A change in the phraseology regarding alloys containing molybdenum and tungsten is also suggested so that it shall read "containing molybdenum or tungsten or both." This is suggested to clear up any uncertainty resulting from a decision of the Court of Customs Appeals which interpreted the

wording of the present act to mean that steel which contained only one of these alloys was not subject to this additional duty. A further change in the paragraph suggested is the insertion of the words "or sintered" in reference to processes of manufacture of these products because of the growing use of this method of fusing metals and alloys.

An amendment is also sought for the paragraph on steel plates and skelp increasing the duties and the valuations fixed in the present act, which assesses a tariff of 7/20 of 1c. per lb. on these materials when valued at 1c. per lb. or less and at 5/10c. when valued over 1c. and under 3c. and 20 per cent when valued over 3c. per lb. The institute desires to revise this by

not thinner than 65/1000 of 1 in. if not less than $\frac{3}{4}$ of 1 in. in diameter) be increased from $\frac{3}{4}$ of 1c. per lb. to 1c. per lb. It is also suggested that seamless tubes be specifically mentioned in view of their growing commercial importance.

Would Protect Gun Forging Plants by Better Protection

An amendment to paragraph 319, relating principally to forgings, is suggested to provide for large chambers or vessels which are imported into this country largely from the Krupp plants in Germany, where, it is stated, they are made in the shops and by the machinery formerly employed in the manufacture of ordnance. The institute asks for higher

provided for," shall be changed to read, "ferrosilicon-aluminum alloy used in the manufacture of steel and all alloys used in the manufacture of steel not specially provided for." It also suggests that the wording, "ferrocium and all other cerium alloys" in the present act be made to read, "ferrocium and all other cerium alloys and all articles composed wholly or in chief value of cerium metal or cerium alloy." The former suggested change refers specifically to alumin, an alloy used exclusively in the manufacture of steel, but which was held dutiable as an aluminum alloy by the Court of Customs Appeals rather than as an alloy used in the manufacture of steel. The second change mentioned above refers to litigation which

Tariff Changes Suggested by American Iron and Steel Institute

INCLUSION of concrete reinforcing bars and sheet steel piling in paragraph 304, with duty increased to 3/10c. per lb.

Increase of duty on cotton ties from $\frac{1}{4}$ c. to 4/10c. per lb.; slight higher duties also proposed on hoops and bands and strip steel.

Higher duty asked on wire rods valued at more than 4c. per lb., also on wire and wire specialties and on certain sizes of wire fencing; a small duty on barbed wire is proposed and a reclassification of wire nails is suggested.

Increased protection of fine steels asked for because of relatively high labor cost; importation of these fine steels, such as rock drills, it is stated, is being seriously felt.

Alloy steels come in for suggested upward revision and a change in the permissible percentage of alloy to $\frac{1}{4}$ of 1 per cent and a tariff of 20 per cent instead of the present 8 per cent.

Upward revision is also asked for steel plates and skelp, steel and iron

sheets, fish plates, splice bars and tie plates.

A duty of \$3 a ton on pig iron is proposed in place of the present one of \$1.12 $\frac{1}{2}$.

That manganese ore should be placed on the free list, that duties on molybdenum ore, tungsten ore and their concentrates are "disproportionately high" and that the duty on ferrosilicon should be reduced to at least one-half of its present amount are further recommendations.

making the duty 1c. per lb. when the value is not more than 3c. per lb. and fixing an ad valorem duty of 35 per cent on values over 3c. per lb. These changes are proposed partly on the ground that such material cannot "honestly be invoiced" at 1c. per lb. or less.

Increased duties on steel and iron sheets are proposed to make the tariffs consistent with the rates in paragraph 304. It is suggested here that the rate of duty in the lowest bracket be $\frac{1}{2}$ of 1c. per lb. instead of 45/100 of 1c. Corresponding increases are requested on the thinner gages. The rate suggested for corrugated or crimped sheets is 8/10 of 1c. per lb. in place of the present duty of $\frac{3}{4}$ of 1c. When values are higher than 3c. per lb. a rate of 35 per cent ad valorem instead of the present 20 per cent is also requested.

Says Outside Diameter Should Be Specified on Tubular Goods

Some confusion having arisen in the interpretation of the phraseology in paragraph 328, relating to pipe, tubes, etc., the institute proposes an amendment so that it shall be understood that the diameter mentioned therein is the outside diameter. It is also suggested that the rate applying to the first bracket (tubular products

protection for these products, which are used largely in the chemical, oil, power and other industries requiring heavy construction that will withstand high pressure reactions at high temperatures, on the ground that their manufacture here would serve to keep alive in a limited way the industry of manufacturing big guns. The present duty on this and similar forged steel articles is 25 per cent ad valorem, which it is proposed to increase to 35 per cent on forgings not machined or otherwise advanced in manufacturing, while on vessels and cylinders a rate of 2c. per lb. and 50 per cent ad valorem is suggested.

It is proposed that the rate on fish plates, splice bars and tie plates carried in the tariff act of 1897 be restored. It was 4/10 of 1c. per lb., whereas the rate in the present act is $\frac{3}{4}$ of 1c. On rail braces and other railroad bars made of iron and steel a rate of 2/10 of 1c. per lb. instead of the present rate of 1/10 of 1c. is proposed.

Wants Phraseology Changes in the Ferrous Alloy Paragraph

In the paragraph relating to ferrous alloys, the institute suggests a change in phraseology whereby that the wording, "all alloys used in the manufacture of steel not specially

has arisen over ferrocium, a sparking metal used in gas lighters, miners' safety lamps, etc., wherein importers have claimed that the article as imported was not ferrocium itself but a manufacture of ferrocium. "Had this contention been successful," says the brief, "the result would have been to admit articles made of ferrocium at a very much lower rate of duty than the ferrocium itself." This amendment is offered to meet this situation.

Would Include Sponge Iron in Muck Bar Paragraph

The insertion of the term "sponge iron or granular iron" in paragraph 303 (which relates to muck bar, bar iron, round iron in coils or rods, iron in slabs, blooms, loops or other forms less finished than iron in bars and more advanced than pig iron, except castings) is suggested "for the reason that importations are increasing and it competes with the muck bars of the paragraph." It is suggested that the first three brackets of the present law be merged, omitting separate classifications for iron valued at not over 1c. per lb. and iron valued at over 1c. and not over 1 $\frac{1}{2}$ c. per lb. respectively. The comment on this follows:

"It is not believed that this will raise the duty on any substantial

quantity of iron that is honestly invoiced, but it will effectually prevent the entry of iron at prices that give reason to suspect dumping."

For sponge iron valued above 1½c. per lb. and not above 2½c. per lb. a duty of 5/10 of 1c. is suggested; valued above 2½c. and not above 3½c. per lb., 1c. per lb.; valued above 3½c. per lb. and not above 5c. per lb., 1½c. per lb.; valued above 5c. and not above 8c. per lb., 2c. per lb.; valued above 8c. per lb., 2½c. per lb.

Duty of \$3 on Pig Iron Asked

In asking for a specific duty of \$3 a ton on pig iron and iron kentledge, the institute says "there has been a very serious diminution in the business of producing iron to be marketed in the form of pigs, particularly in the Eastern part of the United States, due to the fact that that territory bears the brunt of the relatively heavy importations, but the effect has been felt as far west from the Atlantic Coast as Tennessee and as far east from the Pacific Coast as Utah." The present duty of \$1.12½, which has been in effect since March 25, 1927, when it was increased 50 per cent by the President under the flexible provision of the tariff act, is held to be inadequate in view of "the difference in the cost of production between the United States and the principal competing country, British India."

Asks Free Entry of Manganese Ore

Opposing the present duty on manganese ore as "a grievous burden upon the steel industry of this country" and that it is "impolitic, unwise and economically unsound," the institute in its brief says:

"The American Iron and Steel Institute is a firm believer in the principle of protection and protective duties, and were it possible to cultivate the production of manganese ore in this country by means of protective duties, not one word would be uttered in opposition thereto. But the truth is there is not a sufficient supply of manganese ore of the grade required for use in making ferromanganese, and no rate of duty however high can put into the earth that which is not there. Various claims are made that by means of a so-called beneficiation process a low-grade ore, that is to say one that contains a low manganese content, can be stepped up, so to speak, so that a concentrate is obtained with the requisite manganese content for the making of commercial ferromanganese, but by the time this result is reached the cost of production is absurdly high and the article is not available commercially.

"Even under the abnormal stimulus to manganese production in this country, resulting from the enormous demand for manganese during the war and the interruption of foreign supplies due to war conditions on the sea, the domestic production was wholly insufficient to supply the demand. This notwithstanding the phenomenally high prices and the fact that the United States Government, in effect,

financed the mines. The imposition of this duty on manganese ore was an attempt to perpetuate war conditions in times of peace for the benefit of an industry that is an exotic. Since our supplies of manganese ore in this country are so meager that they can be mined only when prices are extremely high, it would seem the better policy to conserve those supplies and to draw freely on the foreign countries—Russia, Africa and Brazil—where there is a bountiful supply of manganese ore.

"For the calendar year 1927 the Government figures show that the equivalent ad valorem of the duty collected on manganese ore was not less than 73.65 per cent, which is a perfectly outrageous duty to impose on a crude substance just as it is taken from the earth and which has to be further manufactured by many different processes before it reaches its ultimate place in commerce. Even when it is converted into ferromanganese it is no further advanced than a substance that is merely thrown into a steel furnace."

The institute makes no specific recommendations on manganese ore or ferromanganese other than that the duty on the ore be discontinued, but it refers to the brief filed by the Bethlehem Steel Corporation and quoted by THE IRON AGE of March 14, page 758, wherein duty-free ore and a reduced duty on ferromanganese are requested.

Molybdenum and Tungsten Ore Duties Held to Be Too High

The duties on molybdenum ore, tungsten ore and their concentrates are also held to be "disproportionately high," although it is stated that, because of their limited use as compared with ferromanganese and ferro-silicon, the effects are not of such widespread damage. As shown by Government figures for 1927, the ad valorem equivalent of the duty taken on molybdenum ore was 41.92 per cent, while that on tungsten ore was not less than 180.75 per cent.

"In the face of these figures," says the brief, "comment is hardly necessary, nor is any argument required to demonstrate that those duties are wholly out of line and cannot be justified on any ground that appeals to human reason. Yet the Ways and Means Committee has before it an application from interested parties asking for an increase in the duty on tungsten ore of 50 per cent over the present oppressive rates."

A reduction in the duty on ferro-silicon to about one-half of its present amount is requested on the ground that the protection given in the tariff act of 1922 to protect and stimulate the domestic industry has been shown by experience to be higher than necessary.

The Superior Steel Corporation, Pittsburgh, will move its general offices from the Union Trust Building to 3122 Grant Building on April 1.

Allegheny-West Penn Merger Plans



Terms of the plan whereby the Allegheny Steel Co., Breckenridge, Pa., will acquire the West Penn Steel Co., also of Breckenridge, have been announced in an offer made to stockholders of the latter company. A majority of the directors of the West Penn company have approved the plan and holders of a majority of the common stock also have assented. The offer made to all holders of West Penn common and preferred stock requires a deposit of the stock with the Union Trust Co., Pittsburgh, by March 20. Date for the deposit of the stock, however, may be extended up to 60 days longer at the discretion of the West Penn committee, which is composed of Julian Burdick, president, Clarence H. Young, John T. Stanier and Maurice C. Bair, directors of the company.

The plan contains several options. Holders of common stock of the West Penn company will be paid \$375 in cash for each share; \$275 in cash and two shares of Allegheny Steel Co. stock; \$225 in cash and three shares of Allegheny Steel Co. stock or 7½ shares of Allegheny Steel Co. stock. For each share of West Penn preferred stock \$110 in cash will be paid or they may be exchanged for two shares of Allegheny Steel Co. stock. Holders of common stock of the West Penn company are to receive a cash dividend of \$25 in the event that the plan becomes operative.

The West Penn company has an authorized capital of \$5,350,000 common stock of which \$1,050,000 is outstanding and \$525,000 of 7 per cent cumulative preferred stock, both classes being of \$100 par value. On a straight exchange of stock, 79,050 shares of Allegheny stock would be required to take up the outstanding West Penn common and preferred shares. Allegheny Steel stock is selling at \$81 to \$82 a share.

Foundry Equipment Orders Gain

Members of the Foundry Equipment Manufacturers Association reported substantial gains in orders and shipments in February. The February index of gross orders, at 197, compares with 180.5 in the previous month and 123.6 in February, 1928. The February index of shipments was 214.8, compared with 177.3 in January. Unfilled orders stood at 321.2 March 1, against 336.1 one month previous.

All of the necessary piping, valves and fittings for the boiler house, turbo-blowers and generator, central pumping station and blast furnace of the Davison Coke & Iron Co., Neville Island, Pittsburgh, are to be installed by the Pittsburgh Valve, Foundry & Construction Co.

This Issue in Brief

Suggestions for improved design are recorded on a special form and submitted for engineering department's consideration. Whether accepted or rejected, the originator is notified. If accepted, the change is passed on to works manager, and sales manager is duly informed.—Page 804.

* * *

Higher production is obtained from working groups made up of two different nationalities. Personnel director reports that a team of five men, made up of three of one nationality and two of another, produces more than a team of five of same nationality.—Page 810.

* * *

Savings result from use of low-manganese structural steel in place of carbon steel where deadweight must be saved. The former carries 40 per cent greater load, and carries an extra premium of not more than one cent a pound.—Page 798.

* * *

Finds laboratory tests preferable to road tests for automobile parts. In the laboratory, tests can be repeated under exactly the same conditions, making it possible to determine a definite margin of safety, and various designs of the same part can be tested simultaneously.—Page 803.

* * *

Upward trend in general manufacturing activity. Though construction and a few other industries show a decline, increases in most industries more than offset the loss.—Page 813.

* * *

Iron and steel price structure is on the whole fairly normal, says Dr. Haney. But the price of steel scrap is out of line, he says, declaring that a further decline is probable before long.—Page 814.

Greater strength in structural steels can be obtained more safely by higher manganese than by higher carbon. Proportional limit, ductility and impact strength are better in manganese steel.—Page 798.

* * *

With fewer employees, Steel Corporation increases earnings. Average payroll during 1928 numbered 221,702, which was 4.25 per cent below 1927. Earnings of 1928 were 16 per cent above 1927.—Page 818.

* * *

Higher duties asked on pig iron and on some steel products. American Iron and Steel Institute declares present tariffs provide insufficient protection against foreign competition in certain parts of country.—Page 823.

* * *

Exact heat treating results wanted are obtained in experimental model furnace before full-size furnace is built. Furnace manufacturer studies requirements of user, so that equipment supplied will be definitely suited to needs of customer.—Page 808.

* * *

Gray iron industry must modernize its sales department, says institute head. Calls attention to increase of nearly 100 per cent in per capita consumption of steel castings during quarter century, while gray iron castings have increased only 15 per cent.—Page 831.

* * *

Demand for steel warrants present high output, says Dr. Haney. That the spurt in production is not speculative nor in excess of current requirements is demonstrated by statistics.—Page 813.

In hot sheet galvanizing, zinc chloride solution provides for better adhesion of zinc than when a flux on the bath is used. This solution acts as a flux, just as sal ammoniac does in ordinary galvanizing.—Page 811.

* * *

Poor light means slow work. To save himself eyestrain and accident, the employee works slowly when light is inadequate. Good lighting decreases spoilage and promotes efficiency, discipline and contentment.—Page 810.

* * *

High-strength boiler plate has silicon 0.20 to 0.30 and manganese 0.60 to 0.90 per cent. It is used for high-pressure work, and is easily fabricated. Ultimate strength is 70,000 to 83,000 lb. on the square inch.—Page 800.

* * *

Favors purer and thinner zinc coatings. German engineer declares that they last comparatively longer than thick coatings, and provide a better method of working.—Page 812.

* * *

High-silicon, high-manganese plates used in ship construction reduce deadweight 10 to 14 per cent. Though it fabricates less easily than mild steel, shopmen soon become acquainted with the material. Use in British warships proves it stands up in service.—Page 799.

* * *

Zinc coating thickness is controlled by adding more or less aluminum. The aluminum is immediately covered, in normal atmosphere, by a layer of oxides, which increases its corrosion resistance.—Page 812.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

Changes in Steel Finishing Mills

STEEL producers need a great deal of flexibility in their steel finishing capacity, and that is increasingly difficult or expensive to secure. For instance, two years and more ago two finishing branches were expected to be in competition, the one tending to displace, or draw trade from, the other. Yet it is these two—sheets and strips—which of late have had the heaviest engagement of all the finishing branches. Thus does steel demand vary in character from time to time, though the unobservant may fancy it is comparatively steady because the total steel tonnage varies only a few per cent from year to year.

With the great development of single-purpose mills many years ago, the steel industry became highly specialized, and the more recent course of construction makes them still more so. It would seem that the more a mill costs the more specialized must be the orders which will give it profitable employment, thereby increasing the risk as to changing demand. Periods of idleness or partial idleness must be counted upon, and profits must be secured somewhere to carry the investment.

Less than ten years after the steel freight car was developed to a state of practical utility that compelled its adoption, there came the heaviest demand, involving large requirements in plates, but never afterward did the car demand mount to the same proportions, even for a single year.

Although nails, and wire generally, were very old commodities, production of wire rods quadrupled and gained 19 per cent in addition in only 13 years—from 1889 to 1902—whereas since 1920 the trend has been downward rather than upward at all.

Rail production made a high record in 1887, but did not break it until 12 years later, although in that period production of all other rolled iron and steel was multiplied more than two and one-half times, the increase being 159 per cent. In 1906 another rail peak was reached. Not only has that remained record high for 23 years, but there is now no visible prospect that it will ever be equaled.

In 1913 less than half a million automobiles and trucks were produced, consuming about 2 per cent of the current rolled iron and steel production, and steel producers scarcely foresaw that the automobile industry would become a large outlet for steel. Only ten years later automobile and truck production exceeded four million, having been multiplied by more than eight. The automobile industry uses only a very few of the many forms into which steel is finished, and thus the increase in demand was made all the more conspicuous.

A rough estimate can be made of the amount of idle finishing capacity that should be allowed for—capacity of which some unpredictable parts are likely to be required in one year or another. It has been estimated that steel finishing exceeds steel making capacity by 20 to 30 per cent, and an estimate of 30 per cent excess is not unreasonable for the present time. Ingot capacity is about 60,000,000 tons per annum, and ordinarily finished rolled steel output runs 73 to 74 per cent of that of ingots. Carrying this out we have 57,000,000 tons of finishing capacity. A fair average of ingot production would be 85 per cent of capacity, which would mean 37,500,000 tons of finished rolled steel, while the rolled steel capacity would be more than 50 per cent in excess of this amount. A steel company needs to have variegated products, nicely or luckily balanced, to carry such an excess, which nevertheless is needful to make sure that the public be served.

Investment Trusts and Trusts



SINCE the public has contracted an appetite for investment trusts it has no small interest in the questions lately asked concerning their relation to some of the happenings in Wall Street. Such trusts have long been in operation in Great Britain and not a few of them have held a high place in the estimation of investors over there. In the United States their growth has been rapid and with the phenomenal rise in stock market values they have accumulated capital in immense amounts. Wall Street is asking what those which have liquidated their holdings in greater or less part are now doing with their money.

In that connection it is fair to say that investment trusts differ quite as much in soundness and in the conservatism of their conduct as did the industrial "trusts" that began to cut a large figure in metropolitan finance about thirty years ago. Then and later we had the broad classification of the consolidations into good trusts and bad trusts. A similar classification may now be made of these aggregations of capital whose relation to the greatest bull market in history is so much discussed. Mr. Warburg's reference to them as "incorporated stock pools" brings up the question of the extent to which they have been used as a medium for the unloading of accumulated securities. The speculator who has bought stocks in great blocks and seen them rise spectacularly in quotational value is unable to sell them without breaking the market. But he can organize an investment trust, transfer to it his securities at top prices and then sell shares in the trust. Of course the investment trust is no more

able to make silk purses out of sow's ears than is anybody else, but in the present state of the public mind nobody seems to think of that.

Wider Field of Physical Examinations

PHYSICAL examination of employees and applicants for employment in industrial plants of Metropolitan Boston may be conducted by the Boston Dispensary, under an arrangement made by the Associated Industries of Massachusetts. The plan will relieve plants of the practice of employing physicians specifically for the purpose. It is now proposed to make similar arrangements with hospitals in other communities of Massachusetts.

The experience of large plants where compulsory physical examination has been operating over a period of years has proved that it works out to the advantage of the worker in guarding him against unnecessary injury and industrial disease and consequent reduction in his earning power, and to the advantage of the owner in reducing his workmen's compensation insurance cost and in bringing about that higher degree of efficiency and productivity of labor which comes with fitting intelligently the physical man to his employment.

Compulsory physical examination has for the most part been restricted to plants large enough to warrant the regular employment of a works physician. The new Boston plan will permit the small establishment to adopt the plan without undue cost, for the fee fixed in the agreement is \$2 per individual examination. The Boston Dispensary is an institution of highest standing. Its clinical facilities will be available, and its staff numbers some of the best physicians and surgeons in Boston.

The examination itself, according to the formal announcement, will remain in the confidential possession of the doctors of the dispensary. The detailed reports will be revealed only to the person examined. However, the doctors will furnish the employer with a definite statement as to their reasons for believing the applicant for employment fit or unfit for the proposed work. For instance, hernia will be noted so as to reduce the likelihood of placing an applicant on work likely to aggravate a pre-existing condition of the sort. Heart and lung difficulties, defects in eyesight and hearing will similarly be brought to the attention of both applicant and future employer.

Reexamination is now held to be highly important, and where a system of the kind is in use it is usually required when an employee returns to work after a prolonged absence on account of disability or lay-off. Also, it is considered good practice to require reexamination of employees when they have reached some prescribed age. What is being done in Massachusetts offers practical suggestions for independent or associated plants in any community.

MONTHS rather than weeks now measure the bookings of many consumers of steel. With the steel producer, it is still a matter of weeks. Ordinarily, in other times, demand sufficient to engage capacity practically to its limit would be reflected in a steady uptrend in prices. Then order books of the

primary producers would be filling along with those of their customers. The extended dating of shipments worked to bolster prices. The present situation is an excellent illustration of the confidence that suppliers will not fail to supply or the railroads to deliver. There is also the point that a large element of producing capacity prefers stability in prices, once they are on a basis of fair profits, rather than uncertainty or advances that are calculated to chill fresh enterprise.

Qualifications for Welders

IN the March *Journal* of the American Welding Society is the following advertisement:

Acetylene welder desires position. Has had three years' experience. Can furnish references.

On the very next page begins a report of preliminary tests made by the Structural Steel Welding Committee, intent upon discovering proper figures for strength to use in designing welded structures. The committee notes that workmen who made the test pieces were required to pass certain qualification tests. But, the report continues, "much difficulty was experienced in this regard. . . . It was necessary to repeat the qualification tests several times. . . . This process of trial and elimination consumed much time and cost considerable money. Five welders were finally obtained whose work came up to the standard."

It would seem, therefore, that welders out of work should change the wording of their advertisements, thus:

Acetylene welder desires position. Has had three years' experience. Can pass qualification tests.

The qualification tests comprise a number of joints made in the presence of an inspector, who judges whether the job is done in a workmanlike manner and who makes some simple tests to get a qualitative idea of the toughness and soundness of the weld metal. Finally five single-vee joints are made in 1/2-in. plate of structural quality, placed either flat or on edge, 20 tension test pieces are cut therefrom and all reinforcement milled off. Following are the average and minimum strengths required:

Process	Average of All Specimens	Lowest Test Permissible
Metallic arc	More than 45,000	40,000
Oxy-acetylene	More than 52,000	50,000

When these figures are compared to the specified strength of standard structural steel (55,000 to 65,000 lb. per sq. in.) the "passing grade" for welders does not seem to be unduly high, in view of the oft-repeated statements of proponents of welding that 100-per cent joints are merely a matter of care. As a matter of fact, a few plain butt joints, both single and double-vee, were tested in the committee's program; even these qualified welders, secured with much difficulty, failed to produce 100 per cent joints by a considerable margin.

That the skill and reliability of the welder is the biggest single factor in making a high-strength joint is recognized by the investigators for the Structural Steel Welding Committee. In an effort to evaluate this personal element the mean deviation of all test results from the average was computed for each welder. Amount of fusion, i. e., extent of the bond between deposited metal and base metal, was also esti-

mated for each test piece. It was found that those welders with the lowest dispersion percentage had the highest fusion percentage; stated in another way, the more consistent performers welded clear to the bottom of the joint. This result was to be expected.

It is doubtless true that several elements of procedure control are as necessary to produce a reliable welded structure as to produce a reliable reinforced concrete structure. The design must be right, the raw materials must be clean and sound, the equipment must be adequate, the supervision must be continuous, and the acceptance test severe. But in welding the greatest of these elements, and apparently the hardest to satisfy at this time, is the skill of the workman.

Seasonal Steel Production

PRODUCTION of steel ingots thus far this year has been at least 5 per cent above that in the same period of any preceding year, and that is more or less an index of what may be expected for the future, until some unusual influence intervenes, for seasonal variation in steel production is now well established. Years prior to 1923 do not count in this connection for they had extraneous or unusual influences.

The regular experience in the last six years, beginning with 1923, has been that of a peak production being reached in March or April. Thus according to precedent we are nearing a peak, and a precise statement of what the precedents show is of interest.

In two of the last six years, 1923 and 1928, the peak month in steel ingot production was April. In the other four years it was March. An approximately exact date may be computed by comparing the relative size of the preceding and ensuing months. For the whole six years we make the average date of peak production March 25. This might be called "normal," but there are some objections to the use of the word in that connection.

The interesting thing now is whether or how this present year will diverge from the average. If it is not to diverge, one should not be disturbed by steel production beginning to decrease in the near future. Precedents do not indicate any substantial decrease to midsummer. In 1924 there was a veritable slump in production, the circumstances of which are well remembered. Last year there was a mild recession, and a short one, for while the peak production had come in April instead of the more common March, the low month was June instead of the much more common July.

Recently there has been evidence of the steel trade making a more favorable appraisal of its future than it did on Jan. 1, but only relatively, for even at the beginning of the year hopes ran high. There were favorable indices then, but there were some that were unfavorable. Perhaps the stronger expectations now entertained are due to observance that the unfavorable influences have not offset the favorable to the extent expected. High money rates have been feared, but the steel industry has now run so long at tonnage gains over any comparable period, by the calendar, that the point may be turned the other way—that the steel industry

may even fare well with high money rates and hence may be expected to fare better still if money rates become more favorable.

Blast Furnace as Scrap Improver

TOO numerous to mention are the foundry troubles laid at the door of "bad scrap." Some of the accusations have justice; others are fancied; some are plain alibis. But like the poor, scrap is always with us. More and more of it will be remelted for foundry iron; a vast tonnage is circulating slowly, from foundry to use to scrap and back to remelt, either in the cupola or one step further back, in the blast furnace.

An interesting suggestion as to the proper means for controlling this mass of metal of doubtful value has been made by Dr. Richard Moldenke. He visions the time when it will be feasible to erect at important foundry centers a special blast furnace in which both good and bad scrap could be remelted into "scrap pig." The raw material might be very cheap material, costing perhaps no more than four or five dollars a ton; the furnace could be so operated that objectionable sulphur and chromium could be eliminated in good measure. The resulting product would be fairly uniform (at least as far as a single cast is concerned) and the cast could be analyzed, graded, and sold for what it is worth.

Such a plan has the great merit that the product would be recognized as a specialty; it would enable foundrymen to use the reclaimed material with intelligence and under closer control, and they would probably find that a considerable portion of their output could be made satisfactorily and economically with this "scrap pig."

Correspondence

Classification of Alloy Steels

To the Editor: Engineers and metallurgists hearing of various new alloys are not interested so much in the names and claims made for them as they are in knowing of what they are composed and what their real limitations are. Due to a variety of trade names for almost identical alloys, it is often confusing to classify them.

I would suggest that if, in addition to the trade name of an alloy, a standard serial name could be included, based upon a classification similar to the S.A.E. classification, it would be a big help to metallurgists in keeping these various alloys straight in their minds and in recognizing the field of application of an alloy from its serial number. For instance, from the name alone it is impossible at present to distinguish a copper-base alloy which is an acid-resisting material from an iron-base alloy which is intended for those applications requiring high strength.

I have been very favorably impressed with the practice of certain manufacturers to do this of their own accord; for instance, Enduro-S-18-8 means Enduro brand of alloy steels—"S" standing for stainless, 18 standing for 18 per cent chromium, and 8 standing for 8 per cent nickel. On the other hand, Ascoloy-33, which we use frequently, is constantly confused with Ascoloy-22 or Ascoloy 35. In this case the number has no relation to the composition of the material. It is a very easy matter for confusion to arise in specifications for material such as this, where the number means nothing except to the maker.

RALPH F. COHN,
Chemical Engineer.

Reynolds Wire Co.,
Dixon, Ill.

Cleveland to Have Foundry Training School

Vocational training conducted by the Cleveland Trade School under the direction of the Cleveland Board of Education in cooperation with various industries will be extended by the addition of a practical training course in foundry work in a well equipped foundry, the construction of which is now under way. The Cleveland school board has authorized the expenditure of \$45,961 for the erection of the building and the equipment will be furnished by the Foundry Group of the American Plan Association. The foundry is expected to be ready for operation in June and will include gray iron, brass and aluminum departments, a pattern shop, core room and finishing department.

A boy taking the vocational course in foundry work will spend all his time in the school during the first year, one-half the time in school and one-half the time as an apprentice in a foundry the second year, most of his time as an apprentice in the third year and all his time as an apprentice in the fourth year.

The foundry apprentice committee, which will cooperate with the Board of Education in conducting the school, consists of: William H. Shilling, Atlas Foundry Co., chairman; Tracy Calhoun, Johnston & Jennings Co.; George Hammink, Wellman Bronze Co.; F. J. Grondie, Kilby Mfg. Co.; W. J. Strangward, Forest City-Walworth Run Foundry Co., and Daniel Gluntz, Gluntz Brass Foundry Co.

New Jersey Steel Treaters Hold First Meeting

The New Jersey chapter of the American Society for Steel Treating (inadvertently designated as the Newark chapter in THE IRON AGE of March 7) held its first monthly meeting March 15 in the Public Service Auditorium, Newark, N. J. The speaker was George A. Richardson, technical director of publicity, Bethlehem Steel Co., Bethlehem, Pa. His lecture, which was accompanied by a liberal use of lantern slides, dealt with the entire process of steel manufacture from the mining and transportation of the ore to the finished product.

Mr. Richardson has traveled more than 60,000 miles in one year in delivering lectures and in routine work connected with his department.

Show Record Production in Malleable Castings

Production of malleable castings for the first quarter of 1929 is expected to break all previous records for a like period. Malleable foundries are now operating at an average of 80 per cent of capacity and some of the foundries in the Central West are handicapped by a scarcity of labor. With the present high production of

automobiles, the motor car manufacturers are said to be using a greater tonnage of malleable castings than ever before. Malleable foundries are making some effort to get better prices for castings and quite a number of contracts for the second quarter have been made at a 5 per cent advance over the first-quarter prices.

Tells of Gray Iron Needs to Secure Expansion

Arthur J. Tuscany, manager of the Gray Iron Institute, Cleveland, was the guest of the New England Foundrymen's Association on Wednesday evening, March 13, at the Exchange Club, Boston. He told of the position of the gray iron foundry today and secured several companies for membership in the institute. Carl S. Neumann, president of the New Britain Machine Co., New Britain, Conn., and president of the New England Foundrymen's Association, was in the chair.

Mr. Tuscany asserted that the gray iron industry is about to engage in the biggest fight it has ever experienced. Between 1901 and 1925, he said, the consumption per capita of steel castings increased nearly 100 per cent, while in the same period output of gray iron castings increased less than 15 per cent. "As production engineers we know our business, but as merchandisers we do not." The growth of other industries has been based very largely on extensive advertising campaigns, "and we are going to see a great deal more of this advertising. One branch of the iron casting industry of this country is to spend \$300,000 in advertising this year. Our greatest problem today is selling and not making castings.

"We, the gray iron foundries," he continued, "are trying to play the game on the rules of 1879, whereas the sheet steel, stamping, pressed steel and welding industries are changing the rules every year to meet existing conditions." According to Mr. Tuscany, every major industry in this country has had to face the same problems as the gray iron has today. The modern method of doing business calls for cooperation, which among different industries, he argued, had increased their business 250 per cent in some eight years.

In 1927, he pointed out, the hollow metal door and trimming manufacturers spent \$10,000 in advertising at a cost of \$1,430 per member of the association. The steel barrel manufacturers spent \$30,000 at a cost of \$1,500 to each member; steel construction, \$280,000, at a cost of \$1,244 to members, and the steel furniture manufacturers, \$30,000, at a cost of \$2,500 per member.

According to his ideas, the gray iron industry must modernize its sales department; must secure proper cost information; must establish uniform trade customs; must find new uses for gray iron; must work with colleges and institutions; must have reliable

statistics on production, stocks on hand, etc.; must devise new methods of handling overproduction; and institute new trade practices.

Foreign Trade Council to Meet in Baltimore

The National Foreign Trade Council will hold its 1929 meeting at Lord Baltimore Hotel, Baltimore, April 17, 18 and 19. One of the principal addresses will be made by James A. Farrell, president United States Steel Corporation, on "World Trade Today and Tomorrow." Other important topics to be discussed are:

"Trade with Latin America," by the Chilean Ambassador, Don Carlos G. Davila.

"Progress in the Far East," by M. J. Falkenburg, Falkenburg Trading Co., Seattle, Wash.

"The Part of Imports in Foreign Trade," by Dean Henry F. Grady, University of California, Berkeley.

Other topics under consideration will be, "Sales Service and Advertising in Foreign Lands," "Credit Insurance on Export Business" and "Installment Selling for Export."

Excursions will include an inspection of the Naval Academy at Annapolis, inspection of Baltimore harbor and the ports of Wilmington and Philadelphia, and a tour of the combined ports of Norfolk, Portsmouth and Newport News in Hampton Roads, Va.

O. K. Davis, India House, New York, is secretary of the council.

Rise in Employment in Ohio

Industrial employment in Ohio in February was 2 points higher than in January and was 10 per cent higher than in February, 1928, states the current bulletin of the Bureau of Business Research of Ohio State University. The largest increase was in the automobile and automobile parts industries, where the number of wage earners was 9 per cent greater in February than in January and was 44 per cent greater than in the same month last year.

In the iron and steel group the best gain was shown by foundries and drop forging companies, which showed an employment increase in February of 5 per cent over January and 11 per cent over February, 1928. Steel works and rolling mills reported an improvement of 1 per cent in February and of 7 per cent compared with February last year. Machinery manufacturers showed an increase of 14 per cent in average employment during the first two months of 1929 as compared with the corresponding period in 1928.

The National Association of Purchasing Agents, 11 Park Place, New York, will hold its annual meeting at the Hotel Statler, Buffalo, June 3 to 6.

Iron and Steel Markets

Production Taxes Steel Works

Ingot Output Close to Capacity and Shortage of Semi-Finished
Steel Is Unrelieved—Pig Iron Stronger in North
But \$1 Lower in South

STEEL ingot production at Chicago is virtually at capacity, and output in the Greater Pittsburgh area averages 95 per cent, with open-hearth furnaces more fully engaged than ever before in the history of the industry. March will undoubtedly break all previous monthly production records, and a continuance of the current high rate through April seems assured.

Heavy specifications in sheets, strips, bars, plates and shapes were driven in by the March 15 deadline on releases against first quarter contracts. Some sheet mills are fully committed on automobile body finishes until July, and on all grades for eight weeks. Producers of hot-rolled strip are heavily booked, in some cases until May 15, and are unable to keep pace with the demands of their customers, forcing them to turn to light plates to supplement their strip stocks.

The largest backlogs in bars and plates are at Chicago, where deliveries of seven to 10 weeks are causing an increasing number of orders to be diverted to mills farther east.

With so much specified tonnage overlapping into the second quarter, price tests are largely postponed. Although some contracts for finished steel have been closed at the advances announced for the next three-month period, the new prices cannot be regarded as fully established until actual shipping orders are placed.

In semi-finished steel, however, the recent increase of \$1 a ton is already effective. Even at the new price level, buyers find that there is little material to be had, and Chicago district consumers of forging quality steel have been forced to place orders with outside mills at the Pittsburgh base price.

The shortage of semi-finished steel finds a counterpart in a growing scarcity of pig iron. Few steel producers have surplus iron and a number have run short of metal, being forced into the open market for their additional requirements.

The recent advance of 50c. a ton in Valley pig iron has stood the test of sales in most grades, and prices are stronger at Buffalo, where two producers have withdrawn from the market.

In sharp contrast is the situation in the South, where pig iron has declined \$1 a ton. At \$15.50, Alabama iron will have an advantage over competitive brands in southern Ohio and will be able to penetrate well into Illinois and Indiana. Weakness in the Birmingham market is attributed to diminished consumption by pipe foundries. Centrifugal pipe, which is being made in larger quantities, takes less metal than the sand cast product, and high money rates have tended to discourage municipal pipe-laying programs.

The money market has not yet put a damper on

structural steel awards. Lettings of fabricated steel in the first two months of this year were virtually on a par with the 1928 average, and business placed in March has been in encouraging volume. Awards for the week totaled 53,000 tons, and new inquiries aggregated 41,000 tons.

The pressure for steel from the automobile industry is still a market feature, although two or three motor car builders are reported to have reduced production slightly.

Rail bookings of 60,000 tons include 28,000 tons for the Southern Railway and a supplementary order of 15,000 tons placed by the St. Paul. The Chicago & North Western has entered the market for 2500 cars and has placed 25 locomotives with the Baldwin works. The Chesapeake & Ohio is inquiring for 500 cars, and the Burlington will build 750 in its own shops.

Oil storage tanks awarded call for 22,000 tons of plates, and 6000 tons was placed by the Pacific Gas & Electric Co. for a pipe line. The Standard Oil Co. of Kansas contemplates laying a 50-mile line.

Two ships for the Matson Navigation Co., San Francisco, on which bids have been opened, will require 20,000 tons of plates and shapes.

Second quarter contracting in cold-rolled strips has brought out a price of 2.75c. per lb., Pittsburgh, a concession of \$2 a ton from the announced base. The lower base represents a compromise which tends to offset the higher net prices on narrow widths under the new card of extras.

Makers of rivets are working on a revision of extras, but the changes are unlikely to be put into effect before the third quarter. Buyers of large rivets are slow in signing second quarter contracts, since the prices asked represent an advance of \$4 a ton.

Heavy melting scrap has advanced 25c. a ton at Pittsburgh, recovering the ground lost a week ago. Scrap markets show mixed trends, but prices on the whole are holding their own.

Copper has been sold as high as 22c. a lb., delivered Connecticut Valley. Leading domestic consumers, alarmed by the scarcity of copper, are arranging to use other metals wherever possible. German users have formed a research institute to discover substitutes.

The European Rail Makers' Association has been renewed for six years, following concessions by British mills. The European Steel Cartel has increased its production quota 2,000,000 tons to 31,287,000 tons. The proportion assigned to Germany is unchanged, but the tonnage allotment is materially enlarged.

THE IRON AGE composite price for pig iron has declined from \$18.38 to \$18.29 a ton, the lowest price since October. The finished steel composite is unchanged at 2.391c. a lb.

**Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics**

Pig Iron, Per Gross Ton:	Mar. 19, 1929	Mar. 12, 1929	Feb. 19, 1929	Mar. 20, 1928
No. 2 foundry, Philadelphia.....	\$21.26	\$21.26	\$21.26	\$20.76
No. 2, Valley furnace.....	18.00	17.50	17.50	17.25
No. 2, Southern, Cin'ti.....	19.19	20.19	20.19	19.69
No. 2, Birmingham.....	15.50	16.50	16.50	16.00
No. 2 foundry, Chicago*.....	20.00	20.00	20.00	18.50
Basic, del'd eastern Pa.....	20.25	20.25	20.25	19.50
Basic, Valley furnace.....	17.50	17.50	17.50	17.00
Valley Bessemer, del'd P'gh.....	20.26	20.01	20.01	19.26
Malleable, Chicago*.....	20.00	20.00	20.00	18.50
Malleable, Valley.....	18.50	18.00	18.00	17.25
Gray forge, Pittsburgh.....	19.26	18.76	18.76	18.51
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace.....	105.00	105.00	105.00	100.00

Rails, Billets, Etc., Per Gross Ton :				
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh..	34.00	34.00	33.00	33.00
Sheet bars, P'gh.....	35.00	35.00	34.00	34.00
Slabs, Pittsburgh.....	34.00	34.00	33.00	33.00
Forging billets, P'gh.....	39.00	39.00	38.00	38.00
Wire rods, Pittsburgh.....	42.00	42.00	42.00	44.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb...	1.85	1.85	1.90	1.85

Finished Steel,				
<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.90	1.90	1.90	1.85
Bars, Chicago.....	2.05	2.05	2.00	2.00
Bars, Cleveland.....	1.95	1.95	1.92½	2.04
Bars, New York.....	2.24	2.24	2.24	2.19
Tank plates, Pittsburgh.....	1.90	1.90	1.90	1.85
Tank plates, Chicago.....	2.05	2.05	2.00	2.00
Tank plates, New York.....	2.17½	2.17½	2.17½	2.17½
Structural shapes, Pittsburgh	1.90	1.90	1.90	1.85
Structural shapes, Chicago.....	2.05	2.05	2.00	2.00
Structural shapes, New York.....	2.14½	2.14½	2.14½	2.14½
Cold-finished bars, P'gh.....	2.20	2.20	2.20	2.20
Hot-rolled strips, Pittsburgh.....	1.80	1.80	1.80	2.10
Cold-rolled strips, P'gh.....	2.75	2.85	2.85	3.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel, Per Lb. to Large Buyers :	Mar. 19,	Mar. 12,	Feb. 19,	Mar. 20,
	1929 Cents	1929 Cents	1929 Cents	1928 Cents
Sheets, black, No. 24, P'gh...	2.85	2.85	2.85	2.90
Sheets, black, No. 24, Chicago dist. mill	3.05	3.05	2.95	3.00
Sheets, galv., No. 24, P'gh...	3.60	3.60	3.60	3.65
Sheets, galv., No. 24, Chicago dist. mill	3.80	3.80	3.70	3.85
Sheets, blue, 9 and 10, P'gh...	2.10	2.10	2.10	2.10
Sheets, blue, 9 and 10, Chicago dist. mill	2.30	2.30	2.20	2.20
Wire nails, Pittsburgh.....	2.65	2.65	2.65	2.65
Wire nails, Chicago dist. mill.	2.70	2.70	2.70	2.70
Plain wire, Pittsburgh.....	2.50	2.50	2.50	2.50
Plain wire, Chicago dist. mill.	2.55	2.55	2.55	2.55
Barbed wire, galv., P'gh.....	3.30	3.30	3.30	3.35
Barbed wire, galv., Chicago dist. mill	3.35	3.35	3.35	3.40
Tin plate, 100 lb. box, P'gh..	\$5.35	\$5.35	\$5.35	\$5.25

Old Material, Per Gross Ton:				
Heavy melting steel, P'gh.	\$18.50	\$18.25	\$18.50	\$14.75
Heavy melting steel, Phila.	16.00	16.00	16.50	13.50
Heavy melting steel, Ch'go.	15.50	15.50	15.75	12.50
Carwheels, Chicago.	14.50	14.50	14.50	14.00
Carwheels, Philadelphia.	16.50	16.50	16.50	15.50
No. 1 cast, Pittsburgh.	15.25	15.00	15.00	14.50
No. 1 cast, Philadelphia.	16.00	16.50	16.50	16.00
No. 1 cast, Ch'go (net ton).	16.00	16.00	16.00	14.50
No. 1 RR. wrot., Phila.	16.00	16.00	16.00	15.00
No. 1 RR. wrot., Ch'go (net).	14.00	14.00	14.00	11.00

Coke, Connellsville,				
Per Net Ton at Oven :				
Furnace coke, prompt.....	\$3.00	\$3.00	\$3.00	\$2.60
Foundry coke, prompt.....	3.75	3.75	3.75	3.75

Metals,				
<i>Per Lb. to Large Buyers:</i>				
	Cents	Cents	Cents	Cents
Lake copper, New York.....	22.12 1/2	20.12 1/2	18.12 1/2	14.25
Electrolytic copper, refinery.....	20.75	19.75	17.75	14.00
Zinc, East St. Louis.....	6.35	6.35	6.35	5.72 1/2
Zinc, New York.....	6.70	6.70	6.70	6.07 1/2
Lead, St. Louis.....	7.37 1/2	7.15	6.85	5.80
Lead, New York.....	7.50	7.25	6.95	6.00
Tin (Straits), New York.....	49.50	48.37 1/2	49.25	52.00
Antimony (Asiate), N. Y.	9.75	9.37 1/2	9.62 1/2	10.25

Pittsburgh

Steel Making Capacity Almost Fully Engaged—50c Advance on Pig Iron, Except Basic, Established

PITTSBURGH, March 19.—Open-hearth steel making capacity is probably more fully engaged now than ever before in the history of the industry, and a low rate of Bessemer converter engagement does not materially bring down the general average of steel production, which in this and nearby districts is close to 95 per cent. Steel must be produced to the limit to accommodate the delivery demands, which are still very pressing on the part of motor car builders. Some of the other consuming industries are taking steel freely, but the requirements are better spread out than in the case of automobiles, which must be ready for the spring demand. It would seem, in view of the heavy rate of motor car output so far this year, that wholesale distributors and retail dealers ought to be pretty well stocked.

Makers of bars, strips and sheets do not seem to be gaining on their obligations, and it is still a common condition that producers are finding it extremely hard to meet the delivery requirements of consumers. Strip and sheet order books have actually increased in the past week and other finished products also have profited in specifications and shipping orders as a result of the fact that last Friday was the last date on which first quarter contracts could be specified.

Strip mills are sold up for fully six

weeks on the hot-rolled product, but most of the orders are on first quarter contracts, which carry lower prices than were named for the second quarter. Some rather heavy second quarter contracting has been going on in cold-rolled strips, but producers seem to have given way on base prices to achieve that result. Large buyers have been taken care of at 2.75c., base Pittsburgh, a concession of \$2 a ton from the announced second quarter base. The new card of extras imposed a higher average of prices and the

recession in the base modifies the net costs under the new card.

In a general way, the higher prices announced over the past five or six weeks are still to be established. Buyers are covered through at least another month on the basis of first quarter prices and are not yet much interested in second quarter tonnages except when there is some price inducement. It is a matter of comment that the price situation does not balance well with the heavy engagement of productive capacity and the heavy commitments the mills have in a number of products.

Pig iron producers have made good the higher prices they named a week ago, except in the case of basic iron, the real price of which is in doubt pending the closing of an inquiry for a round lot. Scrap for steel works and steel foundry use is scarce and very firm in price. Coke prices tend to weaken, since demand is no longer strong.

Pig Iron.—The market now is quotable at the higher prices named by producers a week ago, except on basic iron, and the price of that grade should soon be clarified, as there is an inquiry in the market for 5000 tons. Foundry iron has been sold at \$18,

Valley furnace, for No. 2 grade and does not appear available at less. Sales of Bessemer iron totaling 1500 tons have been made at \$18.50, Valley furnace. There is an inquiry for this grade from New England. Enough malleable iron has been moved at \$18.50, Valley furnace, to indicate that nothing less can be done. There are few merchant producers which are not now well sold into the second quarter, and, with the steel companies needing almost all the iron they are making, the market reflects a condition of supply being none too large for wants.

Prices per gross ton, f.o.b. Valley furnace:

Basic	\$17.50 to \$18.00
Bessemer	18.50
Gray forge	17.50
No. 2 foundry	18.00
No. 3 foundry	17.50
Malleable	18.50
Low phos., copper free	26.50 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Semi-Finished Steel.—Higher prices recently announced for billets, slabs and sheet bars have become well established in the past week, which has been marked by heavy second quarter contracting at \$34, base Pittsburgh or Youngstown, for billets and slabs and \$35 for sheet bars and small billets and slabs. It is still hard for detached mills to find producers with any surplus over and above the requirements of their own mills and their regular customers. Some forging quality steel has been sold into the Chicago district for shipment from Pittsburgh and is said to have brought the full Pittsburgh price and freight to destination. This is an unusual sale, but not entirely surprising in view of the sold-up condition of Chicago district steel plants. Makers of rods are shipping full production on contracts and spot supplies are limited.

Bars, Plates and Shapes.—Specifications and shipping orders for bars remain heavy, and in the past week tonnage reaching the mills was raised by the fact that last Friday was the last day for entering specifications on first quarter contracts. It will be well into next month before present bookings can be completed, and this fact not only delays second quarter contracting, but also the application of the

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.55c.
Blue ann'l'd sheets (No. 10), 1 to 10 sheets	3.45c.
Galv. corrug. sheets (No. 28), per square	\$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 per cent off list	
Machine bolts, 100 count, 60 per cent off list	
Carriage bolts, 100 count, 60 per cent off list	
Nuts, all styles, 100 count, 60 per cent off list	
Large rivets, base per 100 lb.	\$3.50
Wire, black soft ann'l'd, base per 100 lb.	\$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

higher prices named more than a month ago. Plate business also has gained in the past week, chiefly as a result of river barge awards, but to some extent from the fact that Chicago district mills cannot promise the deliveries that are wanted by some consumers. One lot of 11 coal barges and two fuel lighters, taking 1500 tons of steel, went to a local builder, and another local builder is reported to have been awarded 30 barges taking 3000 tons of steel. Structural steel lettings to local shops continue very light, and plain material is not very active in this territory. Neither plates nor shapes yet have become established at 195c., base Pittsburgh.

Wire Products.—This month has shown betterment as compared with last month in specifications for all wire products except nails. The latter still are sluggish, presumably because distributors took full advantage of their fourth quarter of 1928 contracts and stocked up freely to escape the higher first quarter contract prices. The spring movement into consumption has not been sufficiently heavy to compel much fresh buying.

Prices are reported as steady except in the markets where price irregularity is the usual condition on account of the converging competition of several producing districts.

Tubular Goods.—Boiler tubes and mechanical tubing still are doing well, and California continues to take seamless oil country pipe in good volume. In other directions, the market is quiet and the general average engagement of productive capacity is less than 60 per cent. The Monroe-St. Louis gas pipe line, taking 140,000 tons of main and feeder line pipe, has not yet been placed.

Sheets.—It is commonly stated that last week will stand out in the record as one of exceptionally heavy specifications and shipping orders. The leading producer had one of the best weeks on record, as is attested by practically 100 per cent engagement of its mills. In addition to heavy actual requirements by the motor car builders and several of the other large consuming industries, last Friday was the closing date for specifications on first quarter contracts. There are few mills that now are not well committed to the end of next month. Buyers, however, are protected for a like period and the application of the higher prices announced a month or so ago is rendered difficult in the meantime. There is no occasion to change prices of any of the grades, the higher figures of the range quoted on another page referring to second quarter tonnages, of which some have been contracted for but not yet specified.

Tin Plate.—Mill operations have risen slightly more in the past week and may be estimated at fully 90 per cent of capacity. Leading can manufacturers are committed to the idea that it is a good policy to have ample stocks of tin plate and cans in the event of a miscalculation of the size of the pack of one crop or another. Plans call for enlarged acreages in the canning crops and for the operation of many canneries that were idle last year, but it will be some time before the size of the crop will be known.

Cold-Finished Steel Bars and Shafting.—Producers have been successful in getting the great bulk of their cus-

THE IRON AGE Composite Prices

Finished Steel

March 19, 1929, 2.391c. a Lb.

One week ago	2.391c.
One month ago	2.391c.
One year ago	2.364c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, nails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High		Low	
1928	2.391c.	Dec. 11:	2.314c.	Jan. 3
1927	2.453c.	Jan. 4:	2.293c.	Oct. 25
1926	2.453c.	Jan. 5:	2.403c.	May 18
1925	2.560c.	Jan. 6:	2.396c.	Aug. 18
1924	2.789c.	Jan. 15:	2.460c.	Oct. 14
1923	2.824c.	Apr. 24:	2.446c.	Jan. 2

Pig Iron

March 19, 1929, \$18.29 a Gross Ton

One week ago	\$18.38
One month ago	18.38
One year ago	17.75
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1928	\$18.59.	Nov. 27:	\$17.04.	July 24
1927	19.71.	Jan. 4:	17.54.	Nov. 1
1926	21.54.	Jan. 5:	19.46.	July 13
1925	22.50.	Jan. 13:	18.96.	July 7
1924	22.88.	Feb. 26:	19.21.	Nov. 3
1923	30.86.	Mar. 20:	20.77.	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c. to 1.95c.
F.o.b. Chicago.....	2.05c. to 2.15c.
Del'd Philadelphia.....	2.22c. to 2.27c.
Del'd New York.....	2.24c. to 2.29c.
Del'd Cleveland.....	1.95c. to 1.97½c.
F.o.b. Cleveland.....	1.90c. to 2.00c.
F.o.b. Lackawanna.....	2.00c. to 2.10c.
F.o.b. Birmingham.....	2.15c. to 2.20c.
C.i.f. Pacific ports.....	2.35c.
F.o.b. San Francisco mills.....	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.....	2.00c.
F.o.b. Pittsburgh mills, cut lengths.....	2.25c.
F.o.b. Birmingham, mill lengths.....	2.15c.

Rail Steel

F.o.b. mills, east of Chicago dist.....	1.85c.
F.o.b. Chicago Heights mill.....	1.95c.

Iron

Common iron, f.o.b. Chicago.....	2.05c. to 2.10c.
Refined iron, f.o.b. P'gh mills.....	2.75c.
Common iron, del'd Philadelphia.....	2.12c.
Common iron, del'd New York.....	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c. to 1.95c.
F.o.b. Chicago.....	2.05c. to 2.15c.
F.o.b. Birmingham.....	2.15c. to 2.20c.
Del'd Cleveland.....	2.09c. to 2.14c.
Del'd Philadelphia.....	2.10c. to 2.15c.
F.o.b. Coatesville.....	2.00c. to 2.10c.
F.o.b. Sparrow Point.....	2.00c. to 2.10c.
F.o.b. Lackawanna.....	2.00c. to 2.10c.
Del'd New York.....	2.17½c. to 2.27½c.
C.i.f. Pacific ports.....	2.20c. to 2.30c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill.....	1.90c. to 1.95c.
F.o.b. Chicago.....	2.05c. to 2.15c.
F.o.b. Birmingham.....	2.15c. to 2.20c.
F.o.b. Lackawanna.....	2.00c. to 2.10c.
F.o.b. Bethlehem.....	2.00c. to 2.10c.
Del'd Cleveland.....	2.09c. to 2.14c.
Del'd Philadelphia.....	2.01c. to 2.06c.
Del'd New York.....	2.14½c. to 2.24½c.
C.i.f. Pacific ports.....	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh.....	1.90c. to 2.00c.
Wider than 6 in., P'gh.....	1.80c. to 1.90c.
6 in. and narrower, Chicago.....	2.10c. to 2.20c.
Wider than 6 in., Chicago.....	2.00c. to 2.10c.
Cooperage stock, P'gh.....	2.10c. to 2.20c.
Cooperage stock, Chicago.....	2.20c. to 2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill.....	2.20c. to 2.30c.
Bars, f.o.b. Chicago.....	2.30c.
Bars, Cleveland.....	2.35c.
Shafting, ground, f.o.b. mill.....	2.65c. to 3.60c.
Strips, P'gh.....	2.75c. to 2.85c.
Strips, Cleveland.....	2.75c. to 2.85c.
Strips, del'd Chicago.....	3.05c. to 3.15c.
Strips, Worcester.....	2.90c. to 3.00c.
Fender stock, No. 20 gage, Pitts- burgh or Cleveland.....	4.25c. to 4.35c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

	Base per Keg
Wire nails.....	\$2.65 to \$2.75
Galvanized nails.....	4.65 to 4.75
Galvanized staples.....	3.35 to 3.45
Polished staples.....	3.10 to 3.20
Cement coated nails.....	2.65 to 2.75

	Base per 100 Lb.
Bright plain wire, No. 6 to No. 9 gage.....	\$2.50 to \$2.60
Annealed fence wire.....	2.65 to 2.75
Spring wire.....	3.50 to 3.60
Gal'd wire, No. 9.....	3.10 to 3.20
Barbed wire, gal'd.....	3.30 to 3.40
Barbed wire, painted.....	3.05 to 3.15
Woven wire fence (per net ton to retailers).....	65.00
Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Bir- mingham mill prices \$3 a ton higher; Worcester Mass., (wire) mill \$3 a ton higher on produc- tion of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.	

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or North- umberland, Pa.....	\$2.70
Less carloads, Wheeling or Reading.....	2.80

Sheets

Blue Annealed

	Base per Lb.
Nos. 9 and 10, f.o.b. P'gh.....	2.10c. to 2.20c.
Nos. 9 and 10, f.o.b. Chicago dist.....	2.30c.
Nos. 9 and 10, del'd Cleveland.....	2.29c. to 2.39c.
Nos. 9 and 10, del'd Philadelphia.....	2.42c. to 2.52c.
Nos. 9 and 10, f.o.b. Birmingham.....	2.25c. to 2.35c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh.....	2.85c. to 2.95c.
No. 24, f.o.b. Chicago dist. mill.....	3.05c.
No. 24, del'd Cleveland.....	3.04c. to 3.14c.
No. 24, del'd Philadelphia.....	3.17c. to 3.27c.
No. 24, f.o.b. Birmingham.....	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh, No. 1 grade.....	4.00c. to 4.10c.
No. 24, f.o.b. P'gh, No. 2 grade.....	3.80c. to 3.90c.

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.60c. to 3.70c.
No. 24, f.o.b. Chicago dist. mill.....	3.80c.
No. 24, del'd Cleveland.....	3.79c. to 3.89c.
No. 24, del'd Philadelphia.....	3.92c. to 4.02c.
No. 24, f.o.b. Birmingham.....	3.75c. to 3.85c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	3.00c.
No. 28, f.o.b. Chicago dist. mill.....	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.10c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	4.00c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.90c.
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Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills.....	\$5.35
Standard cokes, f.o.b. Gary.....	5.45

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$11.20	25-lb. coating I.C. \$16.70
15-lb. coating I.C. 14.00	30-lb. coating I.C. 17.75
20-lb. coating I.C. 15.30	40-lb. coating I.C. 19.85

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quality Bar Base, 2.65c. to 2.75c. per Lb.	Alloy Differential
S.A.E. Series Numbers	
2000 (¼% Nickel).....	0.25
2100 (1½% Nickel).....	0.55
2300 (3½% Nickel).....	1.50
2500 (5% Nickel).....	2.25
3100 Nickel Chromium.....	0.55
3200 Nickel Chromium.....	1.35
3300 Nickel Chromium.....	3.80
3400 Nickel Chromium.....	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....	0.70
4600 Nickel Molybdenum (0.20 to 0.80 Molybdenum, 1.25 to 1.75 Nickel).....	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....	0.45
5100 Chromium Spring Steel.....	0.20
6100 Chromium Vanadium Bars.....	1.20
6100 Chromium Vanadium Spring Steel.....	0.95
9250 Silicon Manganese Spring Steel (flats).....	0.25
Rounds and squares.....	0.50
Chromium Nickel Vanadium.....	1.50
Carbon Vanadium.....	0.95

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is ¼c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 down to and including 2½ in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

Slabs with sectional area of 16 in. or over carry the billet price; slabs with sectional area of 12 in. to 16 in. carry a \$5 extra above the billet price and slabs with a sectional area under 12 in. carry the bar price.

Band sizes are 40c. per 100 lb. higher.

Rails

	Per Gross Ton
Standard, f.o.b. mill.....	\$43.00
Light (from billets), f.o.b. mill.....	36.00
Light (from rail steel), f.o.b. mill.....	34.00
Light (from billets), f.o.b. Ch'go mill.....	36.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger.....	\$2.80
Spikes, ½ in. and smaller.....	2.50
Spikes, boat and barge.....	3.00
Tie plates, steel.....	2.15

Angle bars.....	\$2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District
and Lorain, Ohio, Mills

Butt Weld		Iron	
Inches	Steel	Inches	Galv.
1/4	45	1/4 and 3/8	+11 +36
1/4 to 3/8	51	1/2	23 5
1/2	56	3/4	23 11
3/4	60	1 and 1 1/4	31 15
1 to 3	62	1 1/2 and 2	35 18
Lap Weld			
2	55	2	23 9
2 1/2 to 6	59	2 1/2 to 3 1/2	25 13
7 and 8	56	4 to 6	30 17
9 and 10	54	7 and 8	29 16
11 and 12	53	9 to 12	26 11
Butt Weld, extra strong, plain ends			
1/4	41	1/4 and 3/8	+13 +48
1/4 to 3/8	47	1/2	23 7
1/2	53	3/4	23 12
3/4	58	1 to 2	34 18
1 to 1 1/2	60		
2 to 3	61		
Lap Weld, extra strong, plain ends			
2	53	2	29 13
2 1/2 to 4	57	2 1/2 to 4	34 20
4 1/2 to 6	56	4 1/2 to 6	33 19
7 to 8	52	7 and 8	31 17
9 and 10	45	9 to 12	21 8
11 and 12	44		

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2 1/4 in.. 40	1 1/2 in. 1
2 1/2 in.—2 3/4 in.. 48	1 3/4 in. 8
3 in. 54	2 in.—2 1/4 in.. 13
3 1/2 in.—3 3/4 in.. 56	2 1/2 in.—2 3/4 in.. 16
4 in. 59	3 in. 17
4 1/2 in. to 6 in.. 48	3 1/2 in. to 3 3/4 in.. 18
	4 in. 20
	4 1/2 in. 21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn	
1 in. 63	3 in. 40
1 1/4 to 1 1/2 in.. 55	3 1/2 to 3 3/4 in.. 50
1 3/4 in. 39	4 in. 53
2 to 2 1/4 in.. 34	4 1/2, 5 and 6 in.. 42
2 1/2 to 2 3/4 in.. 42	

Hot Rolled

2 and 2 1/4 in.. 40	3 1/2 to 3 3/4 in.. 56
2 1/2 and 2 3/4 in.. 48	4 in. 59
3 in. 54	4 1/2, 5 and 6 in.. 48

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take mechanical tube list and discounts. Intermediate sizes are gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads).....	55
Carbon, 0.30% to 0.40%, base.....	50
Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

tomers to contract for the second quarter at 2.30c., base Pittsburgh, an advance of \$2 a ton over the first quarter contract price. It is early for specifications or shipping orders on such commitments; indeed, consumers are supplying their needs from first quarter contracts and will get much of their April requirements on these contracts carrying a price of 2.20c.

Hot-Rolled Flats.—With strip makers generally committed through April as a result of the specifications driven by the fact that last Friday was final date for specifications on first quarter contracts, the application of the higher prices to which makers went several weeks ago is put farther off. Formal second quarter contracting, in the circumstances, amounts to little. Bands are quotable at 2c. to 2.10c., base Pittsburgh, with the lower figure prevailing, while on cooperage stock 2.10c., base, remains the ruling price, despite higher quotations.

Coke and Coal.—There is some activity in furnace coke for use in water gas plants, but the blast furnace demand has decreased and for that use the market lacks firmness. The market still is quotable at \$3 per net ton at ovens, but there are instances where less has been done on tonnages that accumulated during the period between the shrinkage in demand and the putting out of the ovens. Spot foundry coke also is easier and good brands can be bought at \$3.75 per net ton at ovens, which last week were salable at \$4. Coal is fairly active as to yearly contracts, but current demands are light and prices for either spot or future shipment are easy on account of abundant supplies.

Cold-Rolled Strips.—The attempt to establish 2.85c., base, as the minimum second quarter price has not been successful. Large buyers are getting a price of 2.75c., base, on second quarter business and 2.85c., base, has become a small-lot quotation. The new card of extras, raising sharply the cost of narrow material and reducing slightly the wide sizes, probably explains the lack of insistence upon the higher base price.

Old Material.—The market is firmer on heavy melting steel. Offerings of that grade in the March railroad scrap lists brought \$18.50 at one point in the district, \$18.75 at a second point and \$19 at a third. The higher and lower figures were paid by consumers on direct bids and establish the consumer market on strictly No. 1 railroad steel at \$18.50 to \$19. For regular No. 1 heavy melting steel, the last sale was at \$18.50, but the current demand is chiefly from dealers who are short and they are bidding \$18. The full range on this grade, therefore is \$18 to \$19. Heavy steel scrap is far from plentiful and the pressure of mills for shipments on orders is rather insistent. Scrap rails in railroad lists are understood to have sold at \$18.35 to \$18.50. Blast furnace scrap is strong as the result of a purchase of a round lot at \$13 by

a steel maker which has not hitherto been a buyer of that grade. At other points in the district prices range from \$12 to \$12.50. No. 1 cast scrap is slightly firmer.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel.	\$18.00 to	\$19.00
No. 2 heavy melting steel.	16.25 to	16.75
Scrap rails	17.75 to	18.25
Compressed sheet steel.	18.00 to	18.50
Bundled sheets, sides and ends	16.50 to	17.00
Cast iron carwheels.	15.75 to	16.25
Sheet bar crops, ordinary.	18.50 to	19.00
Heavy breakable cast.	12.75 to	13.25
No. 2 railroad wrought.	18.00 to	18.50
Hvy. steel axle turnings.	16.50 to	17.00
Machine shop turnings.	10.50 to	11.00
Acid Open-Hearth Grades:		
Railr. knuckles and couplers	21.50 to	22.00
Railr. coil and leaf springs	21.50 to	22.00
Rolled steel wheels.	21.50 to	22.00
Low phos. billet and bloom ends	22.50 to	23.00
Low phos. mill plates.	21.00 to	21.50
Low phos. light grades.	20.50 to	21.00
Low phos. sheet bar crops	21.50 to	22.00
Heavy steel axle turnings.	17.00 to	17.50
Electric Furnace Grades:		
Low phos. punchings.	21.00 to	21.50
Hvy. steel axle turnings.	16.50 to	17.00
Blast Furnace Grades:		
Short shovelling steel turnings	12.00 to	13.00
Short mixed borings and turnings	12.00 to	13.00
Cast iron borings	12.00 to	13.00
Rolling Mill Grades:		
Steel car axles.	21.00 to	22.00
No. 1 railroad wrought.	14.50 to	15.00
Sheet bar crops.	20.50 to	21.00
Cupola Grades:		
No. 1 cast	15.25 to	15.75
Rails 3 ft. and under.	20.00 to	20.50

Steel Lectures in 25 Cities in Indiana

Six lectures on the treatment and manufacture of steel are to be offered jointly by the Gary Y.M.C.A., the Extension Department of the Engineering School of Purdue University and the Vocational Department of the Gary Public Schools. The subject matter will be presented by John F. Keller, of the Purdue University faculty. This course has been offered to industrial groups in twenty-five Indiana cities with a total enrollment of 4552 men from 566 industrial plants.

Pig Iron Imports Largest Since Last April

WASHINGTON, March 13.—Imports of pig iron in January, amounting to 16,108 gross tons, were the heaviest since last April. When compared with December and January of last year, with totals of 10,825 tons and 11,127 tons respectively, they showed a sub-

stantial gain. British India retained a lead as the source of these imports, supplying 7315 tons; the United Kingdom was second with 5250 tons and the Netherlands third with 3091 tons.

Steel Barrel Makers Have Larger Backlogs

WASHINGTON, March 19.—Production of steel barrels in February totaled 567,398 units, representing 47.6 per cent of capacity, against an output of 558,492 barrels or 48.4 per cent of capacity in January, according to reports received by the Department of Commerce from 27 companies owning or operating 31 plants. Shipments in February were 563,532 barrels, compared with 548,581 in January.

Stocks at the end of February were 60,242 barrels, compared with 56,376 barrels at the end of January. Unfilled orders at the end of February for delivery within 30 days were 345,365 barrels, against 319,704 barrels at the end of January, while unfilled orders for delivery beyond 30 days were 1,198,481 barrels and 1,342,006 barrels respectively.

February production was the greatest since last October. It was 9½ per cent above that of February, 1928, but nearly 10 per cent below the average month of 1928. Unfilled orders were the largest, except for those of Jan. 31, since early in 1927.

Engineering Fellowships at Ohio State University

A fellowship is open at Ohio State University, Columbus, Ohio, to graduates in mechanical, civil and electrical engineering. The stipend is \$750, and no teaching will be required. Details may be had from the Dean of the Graduate School.

The Engineering Experiment Station also cooperates with industry by making its facilities available for research work of graduate fellows supported by associations or companies. The number of these fellowships varies from year to year, and any field of engineering may be represented. The establishment of a fellowship may be contingent upon the availability of a suitable man to undertake the work. Accordingly, applications giving full qualifications will be welcomed at any time during the year by the Director, Engineering Experiment Station.

IMPORTS OF PIG IRON, BY COUNTRIES OF SHIPMENT

	(In Gross Tons)		
	January, 1929	December, 1928	January, 1928
United Kingdom	5,250	2,190	3,750
British India	7,315	5,324	5,634
Germany	3	300	40
Netherlands	3,091	2,323	1,446
Canada	164	352	172
France	...	...	...
Belgium	151	...	...
Norway	51	100	...
Sweden	50	199	56
All others	33	37	29
Total	16,108	10,825	11,127

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4 in. and under 10 in., Pittsburgh	\$34.00
Rerolling, 4 in. and under 10 in., Youngstown	34.00
Rerolling, 4 in. and under 10 in., Cleveland	35.00
Rerolling, 4 in. and under 10 in., Chicago	35.00
Forging quality, Pittsburgh	39.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	\$35.00
Youngstown	35.00
Cleveland	35.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	\$34.00
Youngstown	34.00
Cleveland	34.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$42.00
Cleveland	42.00
Chicago	48.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.55
Old range non-Bessemer, 51.50% iron	4.40
Mesabi Bessemer, 51.50% iron	4.40
Mesabi non-Bessemer, 51.50% iron	4.25
High phosphorus, 51.50% iron	4.15

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	10.00c.
Iron ore, low phos., Swedish, average 68% iron	10.00c.
Iron ore, basic Swedish, average 65% iron	9.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	33.00c. to 35.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	33.00c. to 35.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	\$12.00 to \$12.50

	Per Gross Ton
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00
	Per Lb.
Molybdenum ore, 85% concentrates of MoS ₂ , delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	\$3.00
Foundry, f.o.b. Connellsville prompt	3.75 to 4.85
Foundry, by-product, Chgo ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, 1/2-in., f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	70c. to 75c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

Per Gross Ton

Domestic, 80%, seaboard	\$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid	105.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	\$31.00 to \$34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

Per Gross Ton Delivered

50%	\$83.50
75%	130.00

Per Gross Ton Furnace		Per Gross Ton Furnace
\$35.00	12%	\$39.00
37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio Furnace

Per Gross Ton		Per Gross Ton	
10%	\$31.00	12%	\$35.00
11%	38.00		

Silvery Iron

F.o.b. Jackson County, Ohio Furnace

Per Gross Ton		Per Gross Ton	
6%	\$24.00	10%	\$29.00
7%	25.00	11%	31.00
8%	26.00	12%	33.00
9%	27.00		

Other Ferroalloys

Ferrotungsten, per lb., contained metal del'd	98c. to \$1.05
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovandium, per lb. contained vanadium, f.o.b. furnace	\$5.15 to \$3.65
Ferrocobaltititanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	\$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	\$122.50

Fluxes and Refractories

Fluorspar

Per Net Ton

Domestic, 85% and over calcium fluoride, not over 6% silica, gravel, f.o.b. Illinois and Kentucky mines	\$18.00
No. 2 lump, Illinois and Kentucky mines ..	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	\$18.00 to 19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

Per 1000 f.o.b. Works

	High-Heat Duty Brick	Intermediate Heat Duty Brick
Pennsylvania	\$43.00 to \$46.00	\$35.00 to \$38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$48.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	\$8.50 to 10.00

Magnesite Brick

Per Net Ton

Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

Per Net Ton

Standard size	\$45.00
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Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons ..	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including 1/4 in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List

Semi-finished hexagons nuts	70
Semi-finished hexagons castellated nuts, S.A.E. ..	70
Stove bolts in packages, Pittsburgh ..80, 10 and 5	
Stove bolts in packages, Chicago ..75, 20, 10 and 5	
Stove bolts in packages, Cleveland ..75, 20, 10 and 5	
Stove bolts in bulk, Pittsburgh ..80, 10, 5 and 2 1/2	
Stove bolts in bulk, Chicago ..75, 20, 10, 5 and 2 1/2	
Stove bolts in bulk, Cleveland ..75, 20, 10, 5 and 2 1/2	
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55 60 per cent apply.

Large Rivets

(1/2-In. and Larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland	\$2.90 to \$3.10
F.o.b. Chicago	3.00 to 3.20

Small Rivets

(1/4-In. and Smaller)

Per Cent Off List

F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screw	80, 10 and 5
Milled standard set screws, case hardened ..	80 and 5
Milled headless set screws, cut thread ..75 and 10	
Upset hex. head cap screws, U.S.S. thread ..85	
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

Steel Mills Operating at Practical Capacity—No Letup in Consumers' Demands and Deliveries Lengthen Further

CHICAGO, March 19.—Steel mill operations are at practical capacity. The rate of shipments so far in March is equal to, if not in excess of, the record for the third month of the year. Consumer interest is undiminished, as evidenced by specifications, which were the second largest for any week of this year and the fourth largest since 1925. Likewise, sales of the week take third position so far this year. The total for the past six weeks is the largest for any like period in five years. Orders for steel give little or no indication of speculation. The larger tonnages being sought usually represent actual requirements, which now must be made known further in advance to obtain needed deliveries. Mill books are particularly tight on bars and plates. Prices for both commodities are firmly established.

Producers from competitive producing centers are finding the Chicago territory more fertile as delivery dates extend. On plates and bars, local producers name seven to 10 weeks and Pittsburgh and Ohio mills will ship in 10 days to two weeks. Pressure for standard-section rails is increasing. Chicago rail mills are operating at capacity, and a secondary buying movement is definitely under way.

Reports that farm implement manufacturers would soon go into a seasonal decline in output are not borne out by schedules already arranged for steel shipments. Seasonal adjustments are being made in the types of machines built, but employment in this industry remains steady.

Shortage of raw steel is still a factor in the operation of steel mill departments.

Pig Iron.—New buying of fill-in tonnages and for the next three months is gaining momentum. Shipments continue heavy and afford producers little opportunity to add to the size of furnace stocks. A Milwaukee user of Northern iron is in the market for 4000 to 5000 tons. Several Chicago melters have closed for a total of 6000 tons and a foundry in southern Wisconsin has taken 1500 tons. Southern iron is being quoted \$15.50 a ton, Birmingham, or \$21.51, delivered Chicago. This cut of \$1 a ton has had no effect on the \$20 a ton quotation for Northern iron at Chicago, but it has led to considerable speculation as to the effect on quotations in southern Illinois and Indiana, where freight differentials will allow Southern iron to enter at \$1 to \$3 a ton below St. Louis prices.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25..	\$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75..	20.50
Malleable, not over 2.25 sil.....	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50.....	27.04
So'th'n No. 2 fdy. (all rail).....	21.51
Low phos., sil. 1 to 2, copper free..	29.50
Silvery, sil. 8 per cent.....	30.79
Bess. ferro-silicon, 14-15 per cent...	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Cast Iron Pipe.—It is reported that James B. Clow & Sons, with a bid of \$35.58 a ton, Birmingham, or \$43.50 a ton, delivered, will receive an order for 2600 tons of 6 to 16-in. pipe from

Pontiac, Mich. The low bid, which was not accepted, was on French-made pipe. Mild weather is allowing pipe laying programs to get under way, and as a result shipments are measurably larger. Deliveries are a trifle less prompt on a few sizes. Contractors in the Chicago area are seeking prices on round tonnages and several contracts have been closed. Miscellaneous industries are also entering the market. Among fresh inquiries are 125 tons for a sewage disposal plant at De Kalb, Ill.; 180 tons of 12-in. Class B pipe for Holland, Mich.; 240 tons of 16-in. and 50 tons of 6-in. pipe for Springfield, Ill., and an additional 50,000 ft. of 6-in. and 20,000 ft. of 8-in. pipe for Roseville, Mich. La Crosse, Wis., will buy 3000 ft. of 24-in. pipe through a contractor, and Neenah, Wis., is in need of 100 tons of 4 to 16-in. Class C pipe.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$44.20 to \$46.20; 4-in., \$48.20 to \$50.20; Class A and gas pipe, \$3 extra.

Ferroalloys.—Prices for spiegeleisen are strong at \$34 a ton, Hazard, Pa., for the 19 to 21 per cent grade. Deliveries are satisfactory against contracts.

Prices delivered Chicago: 80 per cent ferromanganese, \$112.56; 50 per cent ferro-silicon, \$83.50 to \$88.50; spiegel-eisen, 19 to 21 per cent, \$40.76.

Sheets.—Prices remain firm at 3.10c. per lb., Chicago, for black sheets; 3.85c. for galvanized, and 2.35c. for blue annealed. Spot buying is of sizable proportions, but forward contracting is moving more slowly than a week ago. Specifications are running ahead of shipments, which are affected by a scarcity of sheet bars. The result is that orders on makers' books are growing larger, while deliveries, now three to four weeks, are less favorable than last week. Barrel manufacturers report that sales are more numerous. Light tank makers and producers of metal lockers and shelving are speeding production. Although shipments to the roofing trade are larger, demand from that source is not as heavy as is usually expected at this time of the year.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 3.10c.; No. 24 galv., 3.85c.; No. 10 blue ann'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Rails and Track Supplies.—Orders for standard-section rails total more than 60,000 tons. The Southern Railway is said to have closed for 28,000 tons, an original purchase for 1929 delivery. Of the total tonnage placed, fully 30,000 tons, or about one-half, will be rolled by Chicago district mills. Several of the orders were for secondary tonnages, this having been the case with 15,000 tons for the Chicago, Milwaukee, St. Paul & Pacific. Inquiry now before the trade totals about 5000 tons in lots of 500 to 1500 tons each. Orders for track accessories amounted to 5000 tons. Inquiry is spotty and is not for more than 15,000 tons, including the needs of railroads that buy track supplies quarterly. The light rail market is without feature. Output of standard-section rails locally is now at mill capacity.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Plates.—Orders for tanks total more than 18,000 tons. The Empire Oil & Refining Co. has ordered 10,000 tons from two Chicago fabricators for erection at East Chicago, Ind. This is about one-half of the tonnage that will be needed. Three oil producers in the Southwest have placed orders for 8000 tons, and two tanks for the Magnolia Oil Co. take 1000 tons. It is reported that the Standard Oil Co. of Kansas will construct a 50-mile oil line. Of most interest in the local railroad equipment market is an inquiry by the Chicago & North Western for 2500 50-ton box cars, requiring 25,000 tons of steel. Specifications from car builders are growing slowly, but, as judged by the number of cars already placed, the volume of releases will expand rapidly in coming weeks. The local plate market is unusually strong. Prices are firm and deliveries at best are in the range of seven to eight weeks for many sizes, while eight to 10 weeks governs on some specifications. Producers to the east of Chicago are promising 10 days' to two weeks' delivery, and on the score of service are taking an increasing number of orders.

Mill prices on plates, per lb.: 2.05c. to 2.15c. base, Chicago.

Wire Products.—Output at wire mills has been advanced to 72 per cent of capacity, following a week of heavy specifications from most classes of users. The manufacturing trade is unusually active. Forward contracting is gaining headway, and specifications are the largest so far this year. Both new purchases and releases against old business so far in March are measurably ahead of the corresponding period a year ago. Needs of the jobbing trade are heavier, though the season is still backward owing to many impassable roads in rural districts. Railroads are showing moderate interest in woven wire fencing, which is moving slowly through the hands of the jobbing trade. Demand for nails is sluggish, but it is reported that stocks in the

hands of dealers are small, and this leads producers to expect a more active period in the near future. Shipments of electrical wire are growing rapidly.

Structural Material.—Outstanding among structural awards is 12,350 tons placed with the McClintic-Marshall Co. for a county court house at Milwaukee. The price bid for fabricating, assembling and delivery was \$786,900. In Chicago, the Interstate Iron & Steel Co. has closed for 2700 tons of fabricated steel for mill additions. Awards for the week total 16,000 tons. Fresh inquiries are not impressive. A cable plant for the Western Electric Co., for which plans have been revised, will take 2500 tons, and a hotel at Milwaukee calls for 1100 tons. It is reported that the La Salle Club has definitely given up the idea of constructing a building, thus withdrawing 5000 tons of steel from the pending list. On the whole, this market is dull for this time of the year.

Mill prices on plain material, per lb.: 2.05c. to 2.15c. base, Chicago.

Hot-Rolled Strip.—Users of hot-rolled strip are well covered for second quarter at present quotations. Specifications are heavy and Chicago hot mills are operating at capacity. Prices are firm.

Cold-Rolled Strips.—Specifications during the past week were unusually heavy because of the March 15 deadline on first quarter contract specifications based on the old card of extras. Output is being speeded and may reach capacity before the end of this week.

Bolts, Nuts and Rivets.—Specifications are steady from most consumers, including manufacturers of farm machinery. Second quarter contracting is well under way at unchanged prices.

Old Material.—Following a period of inactivity, there is now a substantial demand for cast iron wheels. A sale at Michigan City brought \$16 a gross ton, delivered. A local buyer closed for a tonnage at \$15.25 and a later sale was at \$15 a gross ton,

delivered. The market is moderately firm. Users of the heavy tonnage grades have large quantities bought, and in most instances they are getting scrap as it is needed. In the absence of interest among large consumers, the attitude taken by brokers in covering contracts will have an important bearing on prices. Sales of specialties are active, and users are anticipating needs farther in the future.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:

Heavy melting steel.....	\$15.50 to \$16.00
Shoveling steel	15.50 to 16.00
Frogs, switches and guards, cut apart, and misc. rails	16.75 to 17.25
Hydraul. compressed sheets	14.00 to 14.50
Drop forge flashings.....	12.00 to 13.00
Forg'd cast and r'l'd steel carwheels	19.00 to 19.50
Rail'r'd tires, charg. box size	19.00 to 19.50
Rail'r'd leaf spring cut apart	19.00 to 19.50

Acid Open-Hearth Grades:

Steel couplers and knuckles	17.00 to 17.50
Coil springs	19.50 to 20.00

Electric Furnace Grades:

Axle turnings	15.75 to 16.25
Low phos. punchings.....	17.25 to 17.75
Low phos. plate, 12 in. and under	17.25 to 17.75

Blast Furnace Grades:

Axle turnings	11.25 to 11.75
Cast iron borings.....	10.75 to 11.25
Short shoveling turnings...	10.75 to 11.25
Machine shop turnings....	7.50 to 8.00

Rolling Mill Grades:

Iron rails	16.00 to 16.50
Rerolling rails	17.50 to 18.00

Cupola Grades:

Steel rails less than 3 ft..	19.00 to 19.50
Steel rails less than 2 ft..	19.50 to 20.00
Angle bars, steel.....	17.50 to 18.00
Cast iron carwheels.....	14.50 to 15.00

Malleable Grades:

Railroad	19.50 to 20.00
Agricultural	16.50 to 17.00

Miscellaneous:

*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:

Iron angles and splice bars	15.00 to 15.50
Iron arch bars and transoms	21.25 to 21.75
Iron car axles.....	27.50 to 28.00
Steel car axles.....	17.50 to 18.00
No. 1 railroad wrought....	14.00 to 14.50
No. 2 railroad wrought....	13.75 to 14.25
No. 1 bushelling.....	12.00 to 12.50
No. 2 bushelling.....	7.00 to 7.50
Locomotive tires, smooth..	14.50 to 15.00
Pipes and flues.....	10.00 to 10.50

Cupola Grades:

No. 1 machinery cast.....	16.00 to 16.50
No. 1 railroad cast.....	15.50 to 16.00
No. 1 agricultural cast....	14.50 to 15.00
Stove plate	12.75 to 13.25
Grate bars	13.50 to 14.00
Brake shoes	12.50 to 13.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Reinforcing Bars.—Prices for billet steel reinforcing bars out of Chicago warehouses have been advanced \$1 a ton to 2.40c. per lb. The quotable range for carloads is 2.35c. to 2.40c. Sellers of rail steel bars are holding to 2c. to 2.05c. Orders for reinforcing bars are more numerous, but individual tonnages are small and awards are not impressive when compared with this time a year ago. The outlook, however, is favorable. Architects and estimators are busy on projects on which prices will soon be asked. Several sizable jobs are pending. One of these, a building for the Olsen Rug Co., Chicago, will take

about 800 tons. A round tonnage will be needed at Milwaukee for a new county court house.

Bars.—Specifications for mild steel bars are larger than shipments. Deliveries have been extended to the range of six to eight weeks, and even longer on some sizes. Farm implement manufacturers are operating at capacity, and it is reported that they have heavy programs well arranged for the future. Automobile parts manufacturers are producing at an unslackened pace. Deliveries on alloy steel bars range from four to six weeks. Specifications continue to exceed shipments. Prices are steady at 2.65c. to 2.75c. per lb., f.o.b. makers' mills. Demand for tubing made from old rails is brisk. Second quarter contracting for rail steel bars is gaining headway at 1.95c., Chicago Heights.

Coke.—All by-product coke ovens in this district are lighted and shipments are going forward at an unchanged rate. Prices are firm at \$8 a ton, f.o.b. local ovens, or \$8.75, delivered in the Chicago switching district.

Metal Exchange to Trade in Copper Futures

Trading in copper futures will be inaugurated on the National Metal Exchange soon, according to a decision by the board of governors. I. J. Louis, chairman of the copper committee, which has been investigating the practicability of trading in that metal, recommended that copper be listed on the exchange. The copper committee has now been instructed to draw up the necessary rules.

Trading in futures, it is believed, will bring a broadening of activity in future positions and tend to stabilize the copper market.

Listing of lead and antimony on the exchange is also under consideration, committees being engaged in surveying the market position of those metals.

Bessemer Medal for 1928 to C. A. Parsons

The council of the Iron and Steel Institute (Great Britain) has this year awarded the Bessemer Gold Medal of the institute to the Hon. Sir Charles A. Parsons, in recognition of distinguished services in advancing the science of engineering as applied to the manufacture of iron and steel.

The Williams prize of the institute, which was founded by Illyd Williams on his retirement in 1926 for the encouragement of papers of a practical character, has been awarded to the two papers "Blast Furnace Practice in Natal" by J. E. Holgate and R. R. F. Walton, and "The New Plant of the Appleby Iron Co., Ltd." by A. Crooke and T. Thomson. The prize, which is of the total value of \$500, has been awarded in equal portions to the authors of these two papers.

Warehouse Prices, f.o.b. Chicago

Base per Lb.

Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforc'g bars, billet steel.....	2.35c. to 2.40c.
Reinforc'g bars, rail steel.....	2.00c. to 2.05c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands (3/8 in. in Nos. 10 and 12 gages).....	3.20c.
Hoops (No. 14 gage and lighter)...	3.75c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.65c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes, stand. railroad.....	3.55c.
Track bolts	4.55c.
Rivets, structural	3.80c.
Rivets, boiler	3.80c.

Per Cent Off List

Machine bolts	60
Carriage bolts	60
Coach or lag screws.....	60
Hot-pressed nuts, sq. tap. or blank...	60
Hot-pressed nuts, hex. tap. or blank...	60
No. 8 black ann'l'd wire, per 100 lb..	\$3.30
Com. wire nails, base per keg.....	3.20
Cement c't'd nails, base per keg.....	3.20

Philadelphia

Steel Contracts Still Limited—Shape Prices Soft—Pipe Maker Buys 10,000 Tons of Iron

PHILADELPHIA, March 19.—Steel consumers are beginning to show a moderate interest in contracts for the next quarter at the current quotations of 1.95c., Pittsburgh, on bars and 2.05c., Coatesville, on plates. While the bar price is evidently being maintained, plate contracts by large users have not yet provided a real test of the new price. In certain instances, plate mills have granted extensions of first quarter contracts. Contracting for sheets has been decidedly small. Some galvanized sheets are understood to have been sold for delivery in the next quarter at 3.60c., Pittsburgh, \$2 a ton under the recently announced price of 3.70c., Pittsburgh.

Pig Iron.—In the past week two contracts for basic iron, totaling about 11,000 tons, have been placed by eastern Pennsylvania mills at \$20.25 and \$20.50 per ton, delivered. A moderate volume of contracting for second quarter delivery of foundry iron is reported. A Delaware River cast iron pipe maker has closed on about 10,000 tons of foundry iron with a furnace outside the eastern Pennsylvania district. On medium-sized tonnages of foundry iron recently placed, \$21, base, has been obtained. Buffalo sellers have been offering less competition recently. The agent for Indian pig iron is inactive at present, except in offering tonnages for forward delivery, not expecting to receive more iron at this port until May. The Standard Sanitary Mfg. Co., Pittsburgh, is in the market for 2000 to 3000 tons of foundry iron for its Baltimore plant. The Virginia furnace, which has not been in blast since last September, does not expect to blow in until July or August, although stock on the yard has been reduced considerably.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$21.26 to \$21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.76 to 22.26
East. Pa. No. 1X, 2.25 to 2.75 sil.	22.26 to 22.76
Basic (del'd east. Pa.)	20.25 to 20.50
Gray forge	20.50 to 21.00
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	25.29
Va. No. 2X, 2.25 to 2.75 sil.	25.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Billets.—Most consumers have accumulated fair reserves of billets at \$33 per ton for rerolling quality and \$38 per ton for forging grade, so that only a limited number of contracts at \$1 a ton advance are in prospect now for second quarter.

Bars.—Mills are well occupied with heavy specifications on their first quarter contracts and offering from three to four weeks delivery in most cases. No inclination to shade 1.95c., Pittsburgh, or 2.27c., Philadelphia, is evident, and some small contracts for next quarter have been made at this price.

Shapes.—Decided weakness in prices has developed recently in shapes, certain eastern Pennsylvania mills having quoted less than 2c. per

lb., delivered Philadelphia, although apparently an effort is being made in some cases to obtain 2.05c., nearest mill to consumer, or 2.11c., delivered Philadelphia, on second quarter protection. Recently a mill quoting 2.11c., Philadelphia, lost the order to a warehouse, which delivered the material to the buyer's plant at the same price. Recent quotations have ranged from 1.90c. to 1.95c., nearest mill to consumer, or 1.96c. to 2.01c., Philadelphia, only occasional small lots bringing 2c., mill, or 2.06c., delivered Philadelphia.

Plates.—Operations are being maintained at about 80 per cent by eastern Pennsylvania mills and 2.05c., Coatesville, is being quoted for second quarter. Contracts, however, have not been numerous. Two large makers are reported to have extended present contracts at 2c., Coatesville, into the next quarter. No concessions are reported to have been offered from 2.05c., Coatesville, or 2.15c., Philadelphia, for the next quarter, but large plate consumers have not yet approached the mills for their future requirements.

Sheets.—Some small tonnage contracts on blue annealed sheets have been closed at 2.20c., base, for the wider specifications. The narrower sizes, which encounter the competition of continuous sheets, are offered at 2.10c., Pittsburgh, or 2.42c., Philadelphia. Black and galvanized sheets are quiet. Mills are asking 2.95c.,

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finish-d 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.60c.
Cold-fin. steel, sq. and flats	4.10c.
Steel hoops	3.40c.
Steel bands, No. 12 to ⅝-in., inclus.	3.15c.
Spring steel	5.00c.
*Black sheets (No. 24)	4.10c.
†Galvanized sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.25c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Pittsburgh, or 3.27c., Philadelphia, for black and 3.70c., Pittsburgh, or 4.02c., Philadelphia, for galvanized for second quarter contracts. Buyers say that some galvanized business for delivery in the next quarter has been closed at 3.60c., Pittsburgh, and show no haste in covering their future requirements.

Imports.—Pig iron arrivals at this port in the week ended March 16 totaled 2606 gross tons, of which 2500 tons was from the United Kingdom and 106 tons from the Netherlands. A total of 3539 tons of chrome ore was received, 2923 tons from Cuba and 616 tons from Portuguese Africa; 40 tons of ferromanganese came from the United Kingdom and 14 tons of ferrochrome from Switzerland, and 350 tons of spiegeleisen from the United Kingdom. Steel imports consisted of 84 tons of steel bars and 14 tons of structural shapes from Belgium, nine tons of steel bars and eight tons of steel rods from Sweden, 60 tons of steel bands from Germany and 39 tons of steel bands from France.

Old Material.—Prices are decidedly firmer on the basis of recent offers of brokers who are filling contracts. With mills operating at high rates, there is some pressure for deliveries and brokers have paid up to \$16.50 per ton for No. 1 heavy melting steel for Coatesville, Pa., and Claymont, Del., and as much as \$13.50 per ton for No. 2 heavy melting steel for delivery on \$13 per ton orders and \$11.50, delivered, for machine shop turnings on \$11.50 per ton orders. About 2000 tons of blast furnace scrap was bought last week at \$10 a ton, by a consumer at Swedeland, Pa., and a small lot of No. 1 forge fire was taken by an eastern Pennsylvania consumer at \$14.50 per ton, delivered.

Prices per gross ton delivered consumers yards, Philadelphia district:

No. 1 heavy melting steel	\$16.00 to \$16.50
Scrap T rails	15.50 to 16.00
No. 2 heavy melting steel	12.25 to 13.00
No. 1 railroad wrought	16.00 to 16.50
Bundled sheets (for steel works)	11.00 to 11.50
Hydraulic compressed, new	14.50 to 15.50
Hydraulic compressed, old	13.00 to 13.50
Machine shop turnings (for steel works)	11.50
Heavy axle turnings (or equiv.)	14.00 to 14.50
Cast borings (for steel works and roll. mill)	11.00 to 11.50
Heavy breakable cast (for steel works)	15.50 to 16.00
Railroad grate bars	12.50 to 13.00
Stove plate (for steel works)	13.00
No. 1 low phos., hvy., 0.04% and under	20.00 to 21.00
Couplers and knuckles	19.00 to 19.50
Rolled steel wheels	18.50
No. 1 blast f'nace scrap	10.00
Wrot. iron and soft steel pipes and tubes (new specific.)	15.50
Shafting	19.00 to 20.00
Steel axles	22.00 to 23.00
No. 1 forge fire	14.00 to 14.50
Cast iron carwheels	16.50
No. 1 cast	16.00 to 16.50
Cast borings (for chem. plant)	15.00
Steel rails for rolling	17.00 to 17.50

The Universal Pipe Fittings Corporation, New York, has removed its warehouse and general offices to 70 West Street, New York.

New York

Two Buffalo Pig Iron Makers Out of Market—50,000 Tons of Cast Iron Pipe Pending

NEW YORK, March 19.—Inquiry for pig iron has subsided, following rather liberal contracting for the second quarter. In rounding out its purchases for next quarter, the American Radiator Co. closed for 4000 tons of malleable for Buffalo and 4000 tons of foundry iron for Litchfield, Ill. A Connecticut melter has placed a substantial tonnage of basic with a Buffalo producer for water shipment. There still remain a number of large buyers in this district that have not contracted for the coming quarter, but they may elect to place orders from time to time as requirements dictate. Sales in this territory during the week totaled more than 16,000 tons. Furnaces have accumulated comfortable backlogs, and two Buffalo producers have withdrawn from the market. Aggressive selling continues to characterize the policy of one large furnace interest, however, and while the market is technically stronger, prices actually paid by melters thus far have shown little change. Shipments from furnaces are heavy, and in some instances melters have already drawn on iron bought for second quarter delivery.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil.	1.75
to 2.25	\$21.91 to \$22.41
*Buf. No. 2, del'd east.	
N. J.	20.28 to 20.78
East. Pa. No. 2 fdy., sil.	1.75 to 2.25
to 2.25	20.89 to 22.02
East. Pa. No. 2X fdy., sil.	2.25 to 2.75
to 2.75	21.39 to 22.52
East. Pa. No. 1X fdy., sil.	2.75 to 3.25
to 3.25	21.89 to 23.02

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Price delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Plates, Shapes and Bars.—Heavy specifications for bars were received by local steel selling offices during the past week, as March 15 was the last day on which steel companies would accept specifications against first quarter contracts. On bars, most of the mills are booked for four weeks or longer, and the delivery situation has become more acute. Demand for plates and structural shapes, although fairly good, is not as heavy nor as urgent as in bars, sheets and strip. Eastern plate mills will give their customers until March 31 to get in their final first quarter specifications. Neither mills nor buyers have been insistent in closing second quarter contracts, yet many consumers who regularly cover their requirements in this manner have signed up for the next period at the new prices. A request for bids on about 25,000 tons of fabricated steel for the first section of the West Street elevated highway will be issued within about two weeks.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.24c. to 2.29c.; plates, 2.17½c. to 2.22½c.; struc. shapes, 2.14½c. to 2.19½c.; bar iron, 2.14c.

Cast Iron Pipe.—Three inquiries issued during the week call for a total of about 50,000 tons of pipe. The largest is from Albany, N. Y., and specifies 15 miles of 48-in. water pipe, a total of 29,700 tons. The Department of Purchase, New York, will open bids March 25, on 12,000 tons of 4 to 30-in. water pipe for delivery to five different New York City stocks. The Interstate Equipment Corporation, Elizabeth, N. J., is in the market for 2000 to 5000 tons of gas and water pipe for use at Elizabeth. Formal prices are unchanged, but concessions of \$1 to \$3 a ton appear on desirable business. Operating rates of pipe foundries in the North and South are slightly lower than is usual at this season and competition for tonnage is keen.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$38.60 to \$40.60; 4-in. and 5-in., \$43.60 to \$45.60; 3-in., \$53.60 to \$55.60. Class A and gas pipe, \$3 extra.

Sheets and Strips.—In most cases, sheet consumers in this territory specified fully against their first quarter contracts prior to March 15. The volume of specifications was very satisfactory, but the tonnage shipped will be sufficient to supply the needs of most users until at least May 1. This means that it will be several weeks before the recently announced sheet prices, 3.70c., 2.95c. and 2.20c., Pittsburgh, on galvanized, black and blue annealed sheets respectively will receive an adequate test. Mills are not willing to make second quarter contracts at less than the above prices, and with rolling schedules well filled for several weeks, are not yet actively seeking second quarter business. However, galvanized sheets are still obtainable in some instances at 3.60c., Pittsburgh, for spot shipment, and occasional concessions from 2.95c. are reported in black sheets. Hot-rolled strips are generally quoted at 1.90c., Pittsburgh or Cleveland, for the wide sizes and 2c. for the narrow widths. On cold-rolled strip, the base price is now 2.75c., Pittsburgh or Cleveland, for carload lots and 2.85c. for smaller lots.

Warehouse Business.—The early part of this month brought a slight decline in business from the high level of January and February, but demand is beginning to increase, particularly for structural shapes and galvanized sheets. Prices are fairly well maintained, with only occasional concessions on sheets of \$1 to \$2 per ton and similar shading on desirable lots of structural steel.

Coke.—Contracts for about 250,000 tons of industrial coke are pending in this district for the next quarter. Standard foundry and furnace coke, however, continue rather quiet, as most contracts on these grades extend through the first half or the entire

year. Standard furnace coke shows a slight recession, with some prompt shipment carloads available at \$2.90 per ton, Connellsville, but \$3 per ton, Connellsville, is generally quoted. Standard foundry is inactive at \$3.50 to \$3.75 per ton, Connellsville. Special brands are quoted at \$4.85 per net ton, ovens, or \$8.56, delivered to northern New Jersey, Jersey City and Newark, and \$9.44 to New York and

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'd sheets (No. 10)	3.85c. to 3.90c.
Long terme sheets (No. 24)	5.80c.
Standard, tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	.60
1 x 30 in. and smaller	.50 to .50 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller	.60
¾ x 20 in. and smaller	.50 to .50 and 10
Coach screws:	
¾ x 6 in. and smaller	.60
1 x 16 in. and smaller	.50 to .50 and 10
Boiler Tubes —	Per 100 Ft.
Lap welded, 2-in.	\$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

	Standard Steel	Black	Galv.
½-in. butt.	46	29	
¾-in. butt.	51	37	
1-3-in. butt.	53	39	
2½-6-in. lap.	48	35	
7 and 8-in. lap.	44	17	
11 and 12-in. lap.	37	12	

	Wrought Iron	
½-in. butt.	5	+19
¾-in. butt.	11	+9
1-1½-in. butt.	14	+6
2-in. lap.	5	+14
3-6-in. lap.	11	+6
7-12-in. lap.	3	+16

	Tim Plate (14 x 20 in.)	Prime	Seconds
Coke, 100 lb. base box	\$6.45	\$6.20	
Charcoal, per Box	A	AAA	
IC	\$9.70	\$12.10	
IX	12.00	14.25	
IXX	13.90	16.00	

	Terne Plate (14 x 20 in.)	
IC—20-lb. coating	\$10.00 to \$11.00	
IC—30-lb. coating	12.00 to 13.00	
IC—40-lb. coating	13.75 to 14.25	

	Sheets, Box Annealed—Black, C. R.	One Pass	Per Lb.
Nos. 18 to 20			3.80c.
No. 22			3.95c.
No. 24			4.00c.
No. 26			4.10c.
No. 28*			4.25c.
No. 30			4.50c.

	Sheets, Galvanized	Per Lb.
No. 14		4.40c.
No. 16		4.25c.
No. 18		4.40c.
No. 20		4.50c.
No. 22		4.60c.
No. 24		4.75c.
No. 26		5.00c.
No. 28*		5.25c.
No. 30		5.65c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Brooklyn. By-product coke is quoted at \$9 to \$9.40 per net ton, Newark or Jersey City, and \$10.06, New York or Brooklyn.

Ferroalloys.—An inquiry for 1000 tons of ferromanganese for delivery in the second quarter comes from a large motor company which makes much of its own steel. There is also inquiry for 500 tons for delivery through June. Prices are unchanged at \$105, seaboard basis. The spiegel-eisen market is rather tight and, while prices are no higher, the alloy is not as easy to obtain as it was recently. It is stated that an order for 500 tons was accepted last week. Prices are strong at \$34 to \$35 for carload and small lots, with larger tonnages subject to negotiation. Supplies of foreign spiegeleisen are rather difficult to obtain.

Reinforcing Bars.—Business placed during the last week gained considerably, awards of large jobs alone having amounted to 2400 tons. Among these were the foundations for a warehouse in Manhattan, which took 550 tons, and a ramp garage in Jersey City and the New York approach to the Kill van Kull bridge, requiring 500 tons each. Outstanding among the new projects out for bids is a bridge across the Susquehanna River at Columbia, Pa., which will require 4000 tons, and a furniture warehouse in New York, which will take 800 tons. Prices were advanced \$1 a ton on March 15, and distributors in this territory are now quoting 2.05c., Pittsburgh mill, on 40, 50 and 60-ft. lengths and 2.30c., Pittsburgh warehouse, on the cut lengths. Out of New York warehouse, the general quotations are 2.90c., per lb. for lots of 5 tons or more, 3.05c. for lots of 2 to 5 tons and 3.30c. for less than 2 tons, all delivered at job.

Old Material.—Buying prices are advancing on a number of grades. The flow of No. 1 and No. 2 heavy melting steel into the western Pennsylvania district has been resumed, brokers offering up to \$18.50 per ton for No. 1 steel and \$16.50 per ton for No. 2 steel shipped to the Pittsburgh district. As a result, brokers with orders at Coatesville, Pa., and Claymont, Del., have found it necessary to offer \$16.50 and in some instances \$16.75 per ton, delivered, to fill contracts at \$16.50 per ton. A similar situation has appeared in the market for machine shop turnings, brokers buying in New England for shipment to western Pennsylvania at a price equivalent to \$11.50 per ton, delivered Phoenixville, Pa., which is what a consumer there recently paid for a sizable tonnage. Brokers are also paying from 25c. to 50c. a ton more than a week ago for forge fire, steel car axles, railroad malleable cast scrap and rerolling rails.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel.	\$12.85 to \$13.25
Heavy melting steel (yard)	8.50 to 9.50
No. 1 hvy. breakable cast.	11.75 to 12.00
Stove plate (steel works).	8.75 to 9.00
Locomotive grate bars....	8.75 to 9.00
Machine shop turnings....	7.75 to 8.00
Short shoveling turnings....	7.75 to 8.00
Cast borings (blast furn. or steel works)	7.00 to 7.25
Mixed borings and turnings	6.25 to 6.50
Steel car axles.....	18.50 to 19.00
Iron car axles.....	24.50 to 25.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	11.75
Forge fire	10.50 to 10.75
No. 1 railroad wrought....	12.50 to 13.00
No. 1 yard wrought, long....	11.50 to 12.00
Rails for rolling.....	13.50 to 14.00
Cast iron carwheels.....	12.50 to 12.75
Stove plate (foundry)....	9.00 to 9.50
Malleable cast (railroad)....	14.00 to 14.50
Cast borings (chemical)....	11.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	\$16.50
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size.....	14.50
No. 2 cast (radiators, cast boilers, etc.)	14.00

While inquiry for round lots of structural steel in the building field has declined, there is a good demand for small lots, and local fabricating shops are well filled with work.

Local mills quote steel bars at 1.95c., Cleveland. Outside mills generally use a 2c., Cleveland, base for this territory and a 2c., delivered, price in Cleveland. Steel bars, plates and shapes are quoted at 1.95c., Pittsburgh.

Pig Iron.—The demand continues heavy from some districts, but buying has slowed down in others. There is less activity than recently in Michigan, where the larger foundries, including those in the automotive field, have covered for the second quarter. Some foundries that previously contracted have come into the market for additional iron for that delivery. Sales by Cleveland interests totaled 43,000 tons of foundry and malleable iron the past week, or slightly more than during the previous week. The 50c. a ton price advance by Valley furnaces has given the market a firmer tone in sections where Valley producers compete with Lake furnaces. A few inquiries for third quarter contracts came out during the week, but sellers are not yet ready to quote for that delivery. They feel that buyers would not place contracts at the present time except at the current prices and they are not inclined at present to attempt to get higher prices. One factor in the situation is a possible advance of ore prices, resulting in a higher production cost for pig iron. Low phosphorus iron is quiet, although a few small-lot sales are reported at the quoted prices.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	\$19.50
S'th'n fdy., 1.75 to 2.25....	21.50
Malleable	19.50
Ohio silvery, 8 per cent....	29.00
Basic Valley furnace.....	17.50 to 18.00
Stand. low phos., Valley....	26.50 to 27.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Cleveland

Final Specifications of Quarter for Plates, Shapes and Bars Heavy—Sheet Mills Sold Up for Many Weeks

CLEVELAND, March 19.—Specifications against first quarter contracts for steel bars, plates and structural material came out in heavy volume during the week, as most mills set March 15 as the deadline for orders against expiring contracts. Most consumers took out about all the steel covered by these contracts. There has been some further contracting for the second quarter at the \$1 a ton price advance on these products, and some of the mills now have half or more of their consumers under contract. Deliveries have become more deferred, some of the mills not promising shipments of steel bars in less than three or four weeks. The continued heavy production by automobile plants has brought out additional steel bar tonnage for early requirements.

While the demand from the automotive industry continues very heavy, there is less pressure than recently for shipments from two or three motor car manufacturers, which are reported to be reducing their production schedules somewhat. Many of the dealers have heavy stocks of cars which they want to reduce before taking additional shipments, and the volume of retail sales the next few weeks will determine how long the

industry as a whole will keep up its present pace. Automobile manufacturers are very optimistic as to the season's business and expect that production of cars during the first six months will exceed previous records.

Some of the mills, particularly those making auto body sheets and hot-rolled strip would welcome a little decrease in the demand for their products in order to improve the delivery situation.

Sheets.—There is still considerable pressure for deliveries, and consumers who wish to place orders for early shipment have difficulty in finding a mill that can make the desired delivery. Deliveries are still becoming slightly more extended, some of the mills being fully committed on auto body sheets up to July and some being filled up for eight weeks on all grades. While a few second quarter contracts have been taken at the \$2 a ton advance, current orders can still be placed at 2.85c., Pittsburgh, for black sheets, 3.60c. for galvanized and 2.10c. for blue annealed, the latter being competitive with the products of continuous mills, which are quoting 2c. to 2.10c.

Iron Ore.—Consumers are taking increasing interest in the market and considerable tonnage of merchant ore will probably be sold as soon as prices are named. This may be within a week or not until early in April. The Ford Motor Co., which asked that bids be submitted by March 20 on its inquiry, has extended the time to March 30.

Cold-Finished Steel Bars.—Most consumers have covered for the second quarter at the new 2.35c., Cleveland, price, to which there was little resistance. Mills received heavy specifications against 2.25c. contracts before March 15, the deadline date. Some mills are stipulating that material not shipped against old specifications by April 30 is to be canceled. However, consumers are using a large amount of steel and it is expected that practically all the low-priced material will be shipped before that date.

Reinforcing Bars.—Cleveland Union Terminals work is taking much of the local tonnage at present. Several small-lot inquiries are pending from that source, totaling 1000 to 1500 tons. Prices are fairly steady.

Strip Steel.—The demand for hot-rolled strip is in excess of the output. Buyers are crowding mills for shipments and some consumers in the automotive field, such as manufacturers of frames and brake drums, are turning to light plates to supplement their inadequate supply. Consumers generally specified full against first quarter contracts, which were taken at \$2 below the present price, so that there was little tonnage left to be canceled March 15. Some of the mills are committed until May 15. A number of the automobile companies have made informal commitments for the second quarter and other consumers have contracted for that delivery at the new prices of 2c. for 6-in. and narrower strip and 1.90c. for wider than 6 in. Cold-rolled strip is still in very heavy demand and considerable business has been taken in second quarter contracts. While large buyers are being quoted 2.75c., Cleveland, small lots are bringing 2.85c.

Semi-finished Steel. The flow of specifications is heavy, and a local producer now has sufficient orders to keep its plant in full operation for nearly four weeks. All mills that depend on this source of supply have contracted for the second quarter at the \$1 a ton advance, or \$35 Cleveland, Youngstown and Pittsburgh, for sheet bars and \$34 for slabs and large billets. A few have tried unsuccessfully to close for a larger amount than they took for the first quarter.

Bolts, Nuts and Rivets.—Consumers of large rivets are slow in signing second quarter contracts at the \$3.10 per 100 lb. price, which is an advance

of \$4 per ton over the present quarter. Consequently the new price has not been tested. Specifications against first quarter contracts have increased, evidently being stimulated by the higher prices asked for the coming quarter. Makers are working on revisions of rivet extras, but the changes probably will not become effective before the third quarter. Bolt and nut orders continue heavy.

Coke.—With most foundries in this territory at good operations, the demand for foundry coke continues quite heavy. Prices are unchanged. Ohio by-product coke is quoted at \$8.25, Painesville, for March shipment.

Old Material.—The supply of scrap is more plentiful than last month. As a result, dealers are making heavier shipments against old orders and mills are accumulating larger stocks. Some pressure is coming from mills for lower prices but prices are well sustained by the high consumption. Machine shop turnings are holding at the \$1 a ton reduction reported last week and other grades are unchanged. The Ford Motor Co. has sold 5000 tons of machine shop turnings at a reported price of \$7.75. These will be shipped to Ohio mills outside of Cleveland. The only local activity is among dealers who are buying at quoted prices to fill outstanding orders.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades		
No. 1 heavy melting steel	\$15.50 to	\$16.00
No. 2 heavy melting steel	15.00 to	15.50
Compressed sheet steel	15.00 to	15.50
Light bundled sheet		
stamp'gs	12.00 to	12.50
Drop forge flashings	13.00 to	13.25
Machine shop turnings	9.75 to	10.00
No. 1 railroad wrought	13.25 to	13.50
No. 2 railroad wrought	16.00 to	16.50
No. 1 busheling	12.50 to	13.00
Pipes and flues	9.00 to	9.50
Steel axle turnings	12.50 to	13.00
Acid Open-Hearth Grades		
Low phos. forging crops	18.50 to	19.00
Low phos. billet, bloom		
and slab crops	18.50 to	19.00
Low phos. sheet bar crops	18.00 to	18.50
Low phos. plate scrap	18.00 to	18.50
Blast Furnace Grades		
Cast iron borings	11.50 to	11.75
Mixed bor'g and short		
turn'gs	11.50 to	11.75
No. 2 busheling	11.50 to	11.75
Cupola Grades		
No. 1 cast	16.75 to	17.25
Railroad grate bars	11.00 to	12.00
Stove plate	12.00 to	12.50
Rails under 3 ft.	16.75 to	17.25
Miscellaneous		
Railroad malleable	16.00 to	16.50
Rails for rolling	16.25 to	16.50

A number of steel companies and steel trade associations will have exhibit space at the 1929 convention of the Building Officials' Conference of America, to be held at the William Penn Hotel, Pittsburgh, April 22-26. Members of the conference include executives of building departments of about 200 American cities. Among the exhibitors will be the Jones & Laughlin Steel Corporation, Carnegie Steel Co., McClintic-Marshall Co., Pittsburgh Testing Laboratory, A. M. Byers Co., National Metal Molding Co., Stronach Nail Co., National Steel Fabric Co., Blaw-Knox Co., Associated Metal Lath Manufacturers and the Rail Steel Bar Association.

New Russian Agreement with American Firm

A new agreement providing for technical services has been consummated between the Soviet Government and Freyn Engineering Co. of Chicago. By the terms of this agreement the Freyn company will send to Leningrad a group of engineers and specialists who will cooperate with "Giprometz," the State Institute for Projecting New Metal Works, in the planning, design and construction of new iron and steel plants, as well as in the reconstruction and modernization of existing metallurgical plants.

The new agreement was signed March 2, 1929, at the offices of the Amtorg Trading Corporation in New York, by H. J. Freyn, president, and L. T. Shorley, secretary and treasurer of the Freyn Engineering Co., and by Valery I. Mezhlauk, chairman of Giprometz and vice-chairman of the Supreme Council of National Economy of the U. S. S. R.

The group of Freyn engineers will sail from New York about the middle of April, and will begin work in Leningrad May 1. They will be in charge of L. E. L. Thomas, vice-president Freyn Engineering Co.

The program of the Soviet Government for the ensuing five-year period calls for the planning and construction of 10 new iron and steel works, as well as extensive remodeling of old plants. Over one billion dollars is to be spent on iron and steel plants. The Freyn engineers, who are to form the nucleus around which a larger organization is to be built up, will comprise specialists for coke oven plants, blast furnaces, open-hearth and Bessemer plants, rolling mills, and power and electric stations.

French Steel Consumption Shows Sharp Gain

PARIS, FRANCE, March 6.—Total exports of iron and steel in 1928 were about 500,000 metric tons less than in 1927. However, French production of pig iron increased from 9,326,000 metric tons in 1927 to 10,097,000 tons in 1928, and steel output rose from 8,306,000 tons in 1927 to 9,387,000 tons last year. This shows a decided increase in the domestic requirements of France, and it is suggested that, with application of the Loucheur Act for the construction of dwellings and the execution of plans for extensive public works, domestic consumption will take a still larger share of the output of the steel industry. In certain past years France has exported as much as 52 per cent of its total production of iron and steel.

Total apparent consumption of Babbitt metal in February, based on reports received by the Department of Commerce from 31 firms, was 5,720,243 lb., compared with 6,093,267 lb. in January and with 4,470,368 lb. in February, 1928.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to 4 in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	5.95c.
Black sheets (No. 24)	3.50c.
Galvanized sheets (No. 24)	4.45c.
Blue ann'd sheets (No. 10)	3.25c.
No. 9 ann'd wire, per 100 lb.	\$2.95
No. 9 gal. wire, per 100 lb.	3.40
Com. wire nails, base per keg	2.95

*Net base, including boxing and cutting to length.

Pacific Coast

Oil Tanks, Pipe Lines and Shipbuilding Figure in Large Tonnages Placed or Pending

SAN FRANCISCO, March 16 (*By Air Mail*).—Movement in most lines of iron and steel products during the past week continued fairly active, awards of plates, structural shapes and cast iron pipe involved the largest tonnages. Demand for cast iron pipe has fallen off somewhat, inquiries not being as numerous as they were a month ago.

The Columbia Steel Corporation started producing tinplate on its new mill at Pittsburg, Cal., March 12. This is the first time that tin plate has been produced on the Pacific Coast. The capacity of the mill is 50,000 tons a year.

Pig Iron.—Operations of melters have improved somewhat during the past month. Specialty plants and sanitary ware foundries are working on fairly full schedules. Quotations are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	24.00 to 25.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Bars.—Included among the lettings of reinforcing steel bars this week, which exceeded 1600 tons, were 500 and 400 tons respectively for an office building and an apartment house in Los Angeles, placed with unnamed interests. The Pacific Coast Steel Co. took 125 tons for a city hall at Everett, Wash., and 150 tons for an office building in Seattle. The General Construction Co. was awarded the general contract for the West Spokane Street bridge at Seattle, requiring 185 tons of bars. Prices on out-of-stock material continue to range from 2.20c. to 2.30c., base San Francisco and Los Angeles, with a firmer tendency.

Plates.—Bids were opened this week on 13,200 tons for two ships for the Matson Navigation Co., San Francisco. The Commercial Boiler Works, Seattle, was low bidder on a siphon for the Yakima project at Ellensburg, Wash., calling for 1691 tons. The Western Pipe & Steel Co. secured over 3000 tons for 134,000-bbl. tanks for the Richfield Oil Co. and the Rio Grande Oil Co. and 6000 tons for a 20-in. steel pipe line for the Pacific

Gas & Electric Co., San Francisco. The General Engineering & Drydock Co. was awarded 1700 tons for three Coast Guard cutters. Prices are unchanged at 2.35c., c.i.f., the level established several weeks ago.

Shapes.—Structural shape awards this week were the third largest of the year, totaling more than 14,000 tons. Among the larger lots placed were 800 tons for three Coast Guard cutters, placed with the General Engineering & Drydock Co., 710 tons for an apartment house in San Francisco, booked by Judson-Pacific Co., and 370 tons for two apartments on Eddy Street, San Francisco, taken by the McClintic-Marshall Co. The General Construction Co. secured the contract for 1505 tons for the West Spokane Street bridge at Seattle. New inquiries include 6800 tons for two ships for the Matson Navigation Co., San Francisco, and 200 tons for an apartment house in the same city. Plain material is firm at 2.35c., c.i.f. Coast ports.

Cast Iron Pipe.—Awards of cast iron pipe this week were the second largest for any week so far this year, totaling more than 3900 tons. Glen-

dale, Cal., placed 392 tons of 12-in. Class B and 6-in. Class 250 with the American Cast Iron Pipe Co., 84 tons of 4-in. Class 250 with the National Cast Iron Pipe Co. and 188 tons of 16-in. Class B pipe with C. G. Clausen & Co. Paine & Galucci, Inc., secured 2173 tons of 4 to 24-in. Class B pipe for the improvement of South Fifty-sixth Street, Tacoma, Wash. Los Angeles placed 526 tons, 182 tons and 371 tons respectively of 8-in. Class 150 pipe with the American Cast Iron Pipe Co., the National Cast Iron Pipe Co. and the Pacific States Cast Iron Pipe Co. Bids were opened this week on 494 tons of 6 to 12-in. Class B pipe for South Gate, Cal., and on 120 tons of 6-in. Class B pipe for Astoria, Ore. Bids will be opened next week on 165 tons of 4 and 6-in. Class B or Class 150 for Whittier, Cal.

Coke.—Several large shipments of foreign coke are scheduled to arrive on the Coast in the next 10 days or two weeks. Most of the imports will be applied against contracts placed some time ago.

Sheets.—Demand for sheets, while not large, is well sustained and in the aggregate a fair tonnage has been booked. The Central Alloy Steel Co. took 142 tons for license plates for the State of Washington. Other Western States will shortly come into the market for their 1930 requirements.

Birmingham

Alabama Pig Iron Reduced \$1 a Ton—Steel Bookings Continue at a High Rate

BIRMINGHAM, March 19.—With the opening of books for the second quarter on March 14, prices on No. 2 foundry iron were reduced \$1 a ton to \$15.50. Furnace interests are taking business for the new period at this price, but it is too early to determine the strength of the buying movement. Inquiries for second quarter iron had been light previous to the opening of books for that period. The weekly average of shipments has dropped below that of February. No. 4 Bessemer furnace of the Tennessee Coal, Iron & Railroad Co. was put in blast March 12 on foundry iron. The No. 2 Woodward furnace of the Woodward Iron Co. has been changed from foundry to basic iron. Nineteen furnaces are now active, of which 11 are on foundry, seven on basic and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$15.50
No. 1 fdy., 2.25 to 2.75 sil.	16.00
Basic	15.50

Finished Steel.—New business is sufficient to maintain the present rate of production of approximately 78 per cent. One of the larger companies estimates its current business to be about 90 per cent better than at this time last year. Some substantial rail tonnage has recently been

placed in this district. Prices are unchanged and show a fair degree of firmness. Schedules of structural steel fabricators are well filled. New orders of the Virginia Bridge & Iron Co. include 1000 tons for the Martha Mill at Thomaston, Ga., 300 tons for Southern Pacific Railroad bridges and 350 tons for oil refinery at Baton Rouge, La. Pending tonnage for reinforcing bars is good and includes 400 tons for the Jefferson County court house at Birmingham. The Gulf States Steel Co. is operating five open-hearth at Alabama City, an increase of one. The Tennessee company continues to work seven at Fairfield and seven at Ensley.

Cast Iron Pipe.—New business during the past week was better than that of any other week this season. The largest individual order was 8000 tons for Bloomington, Ill., which went to the United States Cast Iron Pipe & Foundry Co. This company also booked several smaller orders from the Eastern territory. Los Angeles placed orders with the American Cast Iron Pipe Co. for 30,000 ft. of 8-in. pipe; with the McWane Cast Iron Pipe Co. for 20,000 ft., and with the National Cast Iron Pipe Co. for 10,000 ft. An order for five miles of pipe for Gadsden, Ala., went to the Cen-

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	3.15c.
Soft steel bars	3.15c.
Small angles, $\frac{3}{8}$ -in. and over.....	3.15c.
Small angles, under $\frac{3}{8}$ -in.	3.55c.
Small channels and tees, $\frac{3}{4}$ -in. to 2 $\frac{1}{2}$ -in.	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker....	5.00c.
Black sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.80c.
Galv. sheets (No. 24).....	5.30c.
Struct. rivets, $\frac{1}{2}$ -in. and larger....	5.65c.
Com. wire nails, base per keg....	\$3.40
Cement c't'd nails, 100 lb. keg....	3.40

tral Foundry Co. Other bookings by the American Cast Iron Pipe Co. include 1000 tons for Tacoma, Wash., and 15,000 ft. for Natchitoches, La. Several smaller tonnages are up for figures, and the immediate outlook is promising. Shipments are improving with the approach of the pipe laying season. Prices are firm at \$37 to \$38 on 6-in. and larger diameters.

Coke.—Occasional contracts are being closed for second quarter foundry. The important requirements for that period have already been covered. Warmer weather has caused a marked decline in sales of heating coke. Prices remain at \$5.

Old Material.—Recent encouraging factors in the market have been the

movement of material into Eastern territories and requests from two consumers for shipments on contracts that have been on the books for a number of weeks. The market shows much less strength than is usual at this season. Recent reductions of pig iron prices are expected to be reflected in the old material market.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel.....	\$12.50
Scrap steel rails.....	\$12.00 to 12.50
Short shoveling turnings....	9.00
Cast iron borings.....	8.00
Stove plate.....	13.50
Steel axles.....	20.00
Iron axles.....	22.00
No. 1 railroad wrought....	10.00 to 10.50
Rails for rolling.....	14.00 to 15.00
No. 1 cast.....	15.00
Tramcar wheels.....	13.00 to 14.00
Cast iron carwheels.....	13.00 to 13.50
Cast iron borings, chem..	13.50 to 14.00

St. Louis

Pig Iron Demand Subsides Slightly—Steel Business Still in Good Volume—Scrap Price Movements Mixed

ST. LOUIS, March 19.—Sales of pig iron during the last week were slightly less in volume than during the preceding period. The St. Louis Gas & Coke Corporation booked orders for 8700 tons, all for second quarter delivery, including 4000 tons for a radiator manufacturer, 800 tons for a Chicago foundry, 500 tons for an Iowa tractor manufacturer and 2400 tons for various Illinois melters. Shipments continue heavy, as melters are pressing for deliveries against contracts. Considerable iron is still to be bought for second quarter. Alabama iron has been reduced \$1 a ton.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	
Granite City, Ill.....	\$20.00
Malleable, f.o.b. Granite City.....	20.50
N'th'n No. 2 fdy., deliv'd St. Louis..	22.16
Southern No. 2 fdy., deliv'd.....	19.92
Northern malleable, deliv'd.....	22.16
Northern basic, deliv'd.....	22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Coke.—The demand for domestic grades of coke shows a let-up as the result of warmer weather. Buying of furnace coke in the district is heavy, and there also is a good demand for foundry coke.

Finished Iron and Steel.—A further slight improvement in the demand for

galvanized sheets is reported by the Granite City Steel Co., while blue annealed sheets continue quite active. Business in tank plates and tin mill black is satisfactory. The outlook for tin plate is good, as manufacturers of cans are expected to come into the market strong within the next 30 to 60 days. Warehouse business shows some improvement, and substantial gains are expected if mills continue to book business at the recent rate. Structural trade is slow, although a number of large projects have been announced.

Old Material.—Mills in the St. Louis industrial district are well sup-

plied with all grades of old material, and they have made no purchases during the last week except at prices below the previous levels. The demand for cast iron carwheels, rails and springs is better than for other items. An Illinois foundry bought a fair-sized tonnage of cast iron carwheels. No. 1 heavy melting steel is 25c. lower, as are No. 2 railroad wrought and stove plate. Railroad malleable is off 50c. Railroad springs are 25c. higher. Cast iron carwheels and agricultural malleable have advanced 50c. Railroad lists include: Chesapeake & Ohio, 8547 tons; Santa Fe, 5200 tons; Burlington, 3990 tons; Louisville & Nashville, 2140 tons; Chicago, Indianapolis & Louisville, 600 tons; New Orleans & Great Northern, 145 tons; Frisco Lines, 44 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel.....	\$13.50 to \$14.00
No. 2 heavy melting or shoveling steel.....	13.00 to 13.50
No. 1 locomotive tires.....	15.00 to 15.50
Miscel. stand.-sec. rails including frogs, switches and guards, cut apart....	15.50 to 16.00
Railroad springs.....	17.50 to 18.00
Bundled sheets.....	10.00 to 10.50
No. 2 railroad wrought....	13.50 to 14.00
No. 1 busheling.....	10.25 to 10.75
Cast iron borings and shoveling turnings.....	9.75 to 10.25
Iron rails.....	15.00 to 15.50
Rails for rolling.....	16.50 to 17.00
Machine shop turnings.....	10.00 to 10.50
Heavy turnings.....	10.00 to 10.50
Steel car axles.....	20.50 to 21.00
Iron car axles.....	28.00 to 28.50
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought....	17.25 to 17.75
Steel rails, less than 3 ft.	16.50 to 17.00
Steel angle bars.....	15.00 to 15.50
Cast iron carwheels.....	15.50 to 16.00
No. 1 machinery cast....	16.00 to 16.50
Railroad malleable.....	16.50 to 17.00
No. 1 railroad cast.....	15.00 to 15.50
Stove plate.....	13.75 to 14.25
Agricult. malleable.....	14.50 to 15.00
Relay. rails, 60 lb. and under.....	20.50 to 23.50
Relay. rails, 70 lb. and over.....	26.50 to 29.00

Canada

Business Betterment Reflected in Increased Earnings by Dominion Steel Companies—Pig Iron Output Gains

TORONTO, ONT., March 19.—The betterment in the iron and steel industry of Canada is indicated in the financial report of the Algoma Steel Corporation, Sault Ste. Marie, Ont., for eight months of its fiscal year which began last July 1. In the eight months net earnings were \$1,914,535, against \$591,088 for the corresponding eight months of the previous fiscal year. In the eight months ended Feb. 28, there was a surplus of \$1,107,201, compared with a deficit of \$214,912 in the first eight months of the 1927-28 fiscal year. In February alone, net earnings were \$381,155. Reports of the Steel Co. of Canada, Ltd., Hamilton, Ont., and of the Dominion Iron & Steel Co., Sydney, N. S., also show improvement on a corresponding scale. Plant operations are almost at capacity.

Further indication of the strong position of the iron and steel industry of Canada is in the high rate of pig iron production. The February output of pig iron was 93,939 gross tons, the largest ever reported for

February, and exceeded by 7 per cent the production of 87,764 tons in January and was 45 per cent above the total of 64,691 tons reported for February, 1928. The gain in February was due to the increased output in Nova Scotia, where production rose to approximately 41,000 tons from 21,000 tons in the previous month, this being more than enough to offset the drop in Ontario's tonnage to 53,000 tons from 67,000 in January. The principal increase was in basic iron, output of which rose to 82,835 tons from 55,183 tons in January. Malleable advanced from 525 tons in January to 5157 tons in February. Foundry iron, however, fell off sharply from 32,056 tons in January to 5947 tons in February. The blowing out of the blast furnace at Port Colborne, Ont., was responsible for much of the decline in Ontario's pig iron production. At the end of February seven blast furnaces were blowing in Canada.

Pig Iron.—Second quarter contracting continues a strong feature of the

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin, rounds, shafting, screw stock.....	3.75c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	5.10c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.30c.
Galv. corrug. sheets.....	5.15c.
Structural rivets.....	3.95c.
Boiler rivets.....	3.95c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-press. nuts, sq. blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex. blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

market. Contracts placed during the week materially swelled the unfilled tonnage on the books of producers. A number of inquiries are still pending. While general business conditions have stimulated the demand for pig iron, the difficulty in procuring some lines of scrap also has brought larger buying of iron. Canadian pig iron prices remain unchanged but are strong.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$23.60
No. 2 fdy., sil. 1.75 to 2.25.....	23.60
Malleable	23.60

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$25.00 to 25.50
No. 2 fdy., sil. 1.75 to 2.25.....	25.00 to 25.50
Malleable	25.00 to 25.50
Basic	24.00 to 24.50

Imported Iron, Montreal Warehouse	
Summerlee	\$33.50
Carron	33.00

Structural Steel.—Prospective demand for steel for bridges and buildings continues to expand. The Hamilton Bridge Co., Hamilton, Ont., will supply 3500 tons for bridges near Vancouver, B. C., for the Canadian Pacific Railway. New business in sight includes 2500 tons for a customs house at Toronto, Ont., for the Dominion Department of Public Works; 1500 tons for hotel at Hull, Que. Other pending projects include 625 tons for a bridge at Chicoutimi, Que., for the Department of Public Works, Quebec; 300 tons for a steel wharf on St. Charles River for the Quebec Har-

bor Commission; 700 tons for bridge at St. Thomas, Ont., for the Michigan Central Railway, of which J. F. Diemling, Detroit, is purchasing agent.

Old Material.—Interest among dealers and consumers has become much more active during the past two or three weeks. There is strong competition among dealers for supplies both for stock and direct shipment to consumers. In the Toronto market, the demand for machinery cast and other iron grades predominates, but occasional orders for heavy melting steel and turnings are appearing from the Hamilton district. Montreal dealers report a strong demand for heavy melting steel, turnings and machinery cast. Prices are unchanged.

Dealers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	\$9.50	\$8.00
Rails, scrap	10.00	9.00
No. 1 wrought....	9.00	\$11.00 to 11.50
Machine shop turnings	7.00	5.00
Boller plate	7.00	6.00
Heavy axle turnings	7.50	7.50
Cast borings	7.50	5.00
Steel turnings	7.00	6.50
Wrought pipe	5.00	6.00
Steel axles	14.00	20.00
Axles, wrought iron	16.00	22.00
No. 1 machinery cast	16.00 to 17.00	17.00
Stove plate	13.00	13.00
Standard carwheels.	16.00	16.00
Malleable	13.00	13.00
Per Net Ton		
No. 1 mach'ry cast.....	\$15.00	....
Stove plate	9.00	....
Standard carwheels	13.00	....
Malleable scrap	13.00	....

river points because of cheap water transportation costs.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	\$20.39 to \$20.89
Ala. fdy., sil. 1.75 to 2.25	19.19
Ala. fdy., sil. 2.25 to 2.75	19.19
Tenn. fdy., sil. 1.75 to 2.25	19.19
S'th'n Ohio silvery, 8 per cent	27.89 to 28.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Warehouse Business.—Irregularities continue in common wire nails at Louisville, where jobbers are quoting as low as \$2.60 per keg. Local warehouses, however, are asking the regular schedule of \$2.95. Otherwise, prices are firm and unchanged.

Coke.—Shipments of by-product foundry coke this month are heavy and district makers still are unable to supply customers with all of the tonnage they need. The situation in domestic coke has eased with the coming of warmer weather. The price of by-product foundry will remain unchanged during April, but domestic grades are expected to drop 50c. a ton or more on April 1. Effective April 1, the railroad freight rate from Ashland, Ky., to Cincinnati will be cut from \$2.14 a ton to \$1.89 and the rate from Portsmouth, Ohio, to this city from \$2.02 to \$1.77. This readjustment has been brought about as a result of a decrease in rates from Hamilton, Ohio, ovens to Cincinnati, effective March 21. Rates to other southwestern Ohio points from Ashland and from Portsmouth have been cut proportionately.

Old Material.—District steel plants have considerable material still due on current contracts and consequently are not doing any forward buying. Despite the lack of demand, the market is fairly steady.

Finished Material.—The leading sheet steel producer has continued to book orders in excess of capacity and its operations are being maintained at full capacity. In view of the fact that backlogs have piled up in impressive fashion, production by all units will be held at the present rate throughout at least the early part of the second quarter, and some units are assured full time operations up to July 1. Prices are firm and unchanged.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$13.75 to \$14.25
Scrap rails for melting.....	13.75 to 14.25
Loose sheet clippings.....	9.75 to 10.25
Bundled sheets	10.75 to 11.25
Cast iron borings.....	9.50 to 10.00
Machine shop turnings.....	9.00 to 9.50
No. 1 busheling	11.00 to 11.50
No. 2 busheling	7.00 to 7.50
Rails for rolling	14.50 to 15.00
No. 1 locomotive tires.....	14.25 to 14.75
No. 2 railroad wrought.....	13.75 to 14.25
Short rails	18.50 to 19.00
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast.....	19.25 to 19.75
No. 1 railroad cast	15.25 to 15.75
Burnt cast	10.50 to 11.00
Stove plate	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	15.25 to 15.75
Agricultural malleable	14.25 to 14.75

Erman, Howell & Co., Inc., Chicago, dealers in scrap iron and steel, will move on March 23 from 652 to 1537 McCormick Building.

Cincinnati

Reduction of \$1 a Ton on Alabama and Tennessee Irons Gives Southern Producers Price Advantage

CINCINNATI, March 19.—Alabama and Tennessee makers have announced a reduction of \$1 a ton on foundry iron to a basis of \$15.50, Birmingham. The cut is expected to have a far-reaching effect in this district for it gives Southern iron a price advantage over Northern iron which it has not possessed for several years. The present prices from Northern furnaces range from \$20.39

to \$21.40, delivered Cincinnati, whereas Southern producers are now quoting \$19.19. In fact, Southern iron can be put into certain other southern Ohio points, such as Hamilton, for less than Northern sellers are asking. At Ohio River points, including Louisville and Evansville, the differential in favor of Southern iron is large. While little business has been booked at the new schedule, it is likely that considerable Southern iron will be purchased by district users for second quarter unless Northern iron quotations are substantially decreased. At any rate, the favorable position enjoyed by Southern makers will serve to intensify competition in territory adjacent to the Ohio River. Bookings in the past week fell off sharply, the largest transaction having called for 500 to 1000 tons of Northern foundry for a Coldwater, Ohio, melter. The most important inquiry is for 5000 tons of foundry iron for the Louisville plant of a sanitary ware company. The Louisville & Nashville is expected to buy 442 tons of foundry iron. An Ohio River furnace is reported to be making low delivered prices to Louisville and to other

Warehouse Prices, f.o.b. Cincinnati

Base per Lb.	
Plates and struc. shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinfrc. bars.....	3.15c.
Rail steel reinfrc. bars.....	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex.....	3.85c.
Squares	4.35c.
Black sheets (No. 24).....	3.90c.
Galvanized sheets (No. 24).....	4.75c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Structural rivets	3.85c.
Small rivets .....	.65 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg.....	2.95
Cement c't'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	7.55
Net per 100 Ft.	
Lap-weld steel boiler tubes, 2-in.....	\$16.00
4-in.	33.00
Seamless steel boiler tubes, 2-in.....	17.00
4-in.	34.00

Buffalo

Pig Iron Demand Subsides but Furnaces Are Heavily Sold —Steel Scrap Stronger—Mills Very Busy

BUFFALO, March 19.—The active demand of the past few weeks for pig iron has subsided. The total tonnage inquired for in the past week was 2500 to 3000 tons. The largest single inquiry was for 600 tons. Makers are sold up well into the second quarter. A stiffened attitude is reported on Eastern business, with most of the local makers declining to make any price in New England figuring out lower than \$18, Buffalo. In this district, \$18.50 base, is holding.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....	\$18.50
No. 2X fdy., sil. 2.25 to 2.75.....	19.00
No. 1 fdy., sil. 2.75 to 3.25.....	20.00
Malleable, sil. up to 2.25.....	19.00
Basic	17.50
Lake Superior charcoal.....	27.28

Finished Iron and Steel.—A continuance of the 85 to 95 per cent operation of Buffalo district steel mills is reported, with no immediate sign of a letup. Open-hearth capacity is being pushed to the limit to provide for the heavy requirements of the rolling mills, most of which are on double turn, and some of the roughing mills are on triple turn. Bars, shapes, plates and sheets are maintaining their strength. Structural fabricators are keeping busy on small-sized jobs. The awarding of one 400-ton structural job is reported.

Old Material.—Dealers are freely paying \$17.50 for No. 1 heavy melting steel for delivery against one of the mill orders of a few weeks ago, while at the same time deliveries are being made to another consumer on the bases of \$16.50 for No. 1 and \$15 for No. 2 steel. The latest order of the first-named mill is understood to have been placed at \$17.75. Another sale of 5000 tons was made to a district consumer at \$17.50 to \$17.75. A good demand exists for No. 1 machinery cast scrap, knuckles and couplers and for the blast furnace grades. There

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.75c.
Cold-fin. flats, sq. and hex.....	4.45c.
Rounds	3.95c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$3.60
Black wire, base per 100 lb.....	3.75

is a scramble for No. 2 steel by the dealers, many of them freely offering \$14.75 to apply against the recent orders. It is estimated that about 15,000 tons of No. 1 heavy melting steel sold at \$18 is still to be shipped.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.....	\$17.50 to \$17.75
No. 2 heavy melting steel.....	15.00
Scrap rails	17.00 to 18.00
Hydraul. comp. sheets.....	15.00
Hand bundled sheets.....	12.00 to 12.50
Drop forge flashings	14.00 to 14.50
No. 1 busheling	16.25 to 16.50
Hvy. steel axle turnings.....	14.00 to 14.50
Machine shop turnings.....	8.00 to 8.50
No. 1 railroad wrought.....	13.50 to 14.00

Acid Open-Hearth	
Knuckles and couplers.....	19.00 to 19.50
Coil and leaf springs.....	19.00 to 19.50
Rolled steel wheels	19.00 to 19.50
Low phos. billet and bloom ends	20.00 to 20.50

Electric Furnace Grades	
Short shov. steel turnings.....	13.50 to 14.00

Blast Furnace Grades	
Short mixed borings and turnings	11.50 to 12.50
Cast iron borings	11.50 to 12.50
No. 2 busheling	10.00 to 10.50

Rolling Mill Grades	
Steel car axles	18.75 to 19.25
Iron axles	21.00 to 22.00

Cupola Grades	
No. 1 machinery cast.....	16.00 to 17.00
Stove plate	14.50 to 15.00
Locomotive grate bars.....	13.50 to 14.00
Steel rails, 3 ft. and under.....	19.50 to 20.00
Cast iron car wheels.....	14.00 to 14.50

Malleable Grades	
Industrial	18.50 to 19.00
Railroad	18.50 to 19.00
Agricultural	18.50 to 19.00

Boston

Some Blast Furnaces Withdrawing From Market—Scrap Producers Holding for Better Prices

BOSTON, March 19.—The Mystic Iron Works reports pig iron sales the past week of about 5000 tons. Other furnace interests report little iron sold and no open inquiries of importance in hand. Their inactivity is due very largely to the fact that they have little or no iron to sell, some furnaces having withdrawn from the market or having only a few thousand tons available for second quarter delivery. Some of the largest consumers are still uncovered for second quarter. A Buffalo district steel mill is reported as still offering iron at less than \$18 a ton, base furnace, but this

report is not substantiated by actual sales. New York State iron is limited in supply and strong at \$18, \$18.50 and \$19.50 a ton for No. 2 plain, No. 2X and No. 1 respectively.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25.....	\$21.91 to \$22.91
*Buffalo, sil. 2.25 to 2.75.....	22.41 to 23.41
East Penn., sil. 1.75 to 2.25.....	24.15 to 24.65
East Penn., sil. 2.25 to 2.75.....	24.65 to 25.15
Va., sil. 1.75 to 2.25.....	25.21
Va., sil. 2.25 to 2.75.....	25.71
Ala., sil. 1.75 to 2.25.....	22.41 to 24.27
Ala., sil. 2.25 to 2.75.....	22.91 to 24.77

Freight rates: \$4.91 all rail from Buffalo; \$3.65 from eastern Pennsylvania; \$5.21 all rail from Virginia; \$6.91 to \$8.77 from Alabama.

*All rail rate.

Old Material.—The scrap market is only moderately active. Dealers say they could dispose of considerable material if available, but owing to the buoyancy of non-ferrous scrap prices owners of steel scrap are holding stocks in anticipation of better values. A Worcester, Mass., consumer is buying long bundled skeleton, as are consumers in the Pittsburgh district, which accounts for the wide spread in quotations. Light buying of steel axles for Pennsylvania delivery is reported at firmer prices. In contrast, shafting is bringing less than a week ago. There is a market for rails for rolling, but scarcely any are available. The Swedish steamer Hedrum has been chartered to load scrap here this month for Danzig delivery.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.....	\$12.00 to \$12.25
Scrap T rails.....	12.00 to 12.25
Scrap girder rails	11.00 to 11.50
No. 1 railroad wrought.....	11.50 to 12.00
No. 1 yard wrought.....	9.50 to 10.00
Machine shop turnings.....	6.25 to 6.50
Cast iron borings (steel works and rolling mill).....	6.50 to 7.00
Bundled skeleton, long.....	9.00 to 10.00
Forge flashings	10.00 to 10.50
Blast furnace borings and turnings	6.00 to 6.25
Forge scrap	9.00 to 9.50
Shafting	14.50 to 14.75
Steel car axles.....	17.00 to 17.50
Wrought pipe 1 in. in diameter (over 2 ft. long).....	10.75 to 11.00
Rails for rolling	12.25 to 12.50
Cast iron borings, chemical.....	10.00 to 10.50

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$14.50 to \$15.00
No. 1 machinery cast.....	15.50 to 16.00
No. 2 machinery cast.....	13.50 to 14.00
Stove plate	11.50 to 12.00
Railroad malleable	17.50 to 18.00

Railroad Supplies.—The Boston Transit Commission rejected bids taken recently for 1050 tons of rails. The Bethlehem Steel Co. was the only bidder. The commission last week took bids on supplies as follows: Bethlehem Steel Co., 11,000 lb. angle bars, 5.05c. per lb., f.o.b. Boston; 11,000 lb. angle bars for T rails, 3.76c.; 209,400 lb. tie plates, 2.48c.; 21,000 lb. tie plates for Hatfield

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.265c.
Structural shapes—	
Angles and beams	3.265c.
Tees	3.265c.
Zees	3.465c.
Soft steel bars, small shapes.....	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars.....	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats.....	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.....	*3.55c. to 5.55c.
Squares and flats.....	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler.....	4.50c.
Per Cent Off List	
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

joints, 6.56c.; 13,000 lb. No. 22 flat tie plates, 2.73c.; 9000 lb. slotted tie plates, 3.83c.; 1200 lb. $\frac{1}{8}$ -in. small shims, 5.03c.; 5400 lb. 3/16-in. small shims, 3.05c.; 4300 lb. $\frac{1}{8}$ -in. large shims, 11.07c.; 15,100 lb. 3/16-in. large shims, 7.03c.

Coke.—Foundries are specifying more freely on first half by-product coke contracts, an indication of an increase in the melt of iron, which is now estimated at 80 to 85 per cent of capacity, the highest in more than a year. Ovens continue to make shipments at \$11 a ton, delivered within a \$3.10 freight rate zone.

Imports.—Receipts of foreign pig iron during the first half of March consisted only of 65 tons of Scotch iron.

Gain in German Exports

WASHINGTON, March 16.—German exports of iron and steel products in January totaled 338,917 metric tons, compared with 216,109 tons in the previous month and 338,361 tons in November, according to a radiogram received by the Department of Commerce from Berlin. Imports decreased to 160,520 tons in January as compared with 170,493 tons in December.

Production of pig iron in January totaled 1,097,980 tons, compared with 882,959 tons in December, although the number of furnaces in blast at the end of January was 97, compared with 101 at the end of December. Raw steel output in January increased to 1,469,653 tons from 1,090,615 tons in December, a gain of 379,038 tons.

Of the 21 classifications of material in export trade, 18 showed increases in January. The greatest gain (40,726 metric tons) was in bars, rods and angles, the January movement being 82,752 tons as compared with 42,026 tons in December. Plain wire exports increased 18,713 tons to 43,168 tons, from 24,455 tons. Exports of ingots and semi-finished steel made a gain of 14,123 tons to 23,008 tons from 8885 tons, while plates and sheets showed an increase of 13,795 tons, rising to 34,125 tons from 20,330 tons.

Aluminum Shop Crane to Be Built

The Alliance Machine Co., Alliance, Ohio, has received an order from the Aluminum Co. of America for a 10-ton traveling shop crane, the main girders of which will be constructed from strong aluminum alloy. This use of aluminum will materially reduce the wheel load on the building and, it is expected, will also reduce operating costs.

Upon completion the aluminum crane will be installed in the new structural shape mill at the Aluminum Co.'s Massena works. At the same time it is planned to install a duplicate of this crane built of steel in the blooming mill at Massena so that direct comparisons of operating expenses can be made.

European Rail Accord Renewed

British Producers Make Some Concessions—Continental Steel Entente Increases Quota 2,000,000 Metric Tons

WASHINGTON, March 19.—The accord establishing the European Rail Manufacturers' Association has been renewed for six years and an agreement has been reached between Continental and British producers, the latter having made certain concessions, according to a cablegram received by the Department of Commerce from Commercial Attache H. C. MacLean, Paris. Penalties for exceeding quotas, it was announced, will begin at 20s. to increase to £1 later. The next meeting will be held in London April 14.

Another cablegram from Mr. MacLean said that the Continental Steel Entente, meeting in Brussels on

March 14, agreed to increase its annual production quota 2,000,000 metric tons, bringing the total to 31,287,000 tons. This action became necessary when it was found that every member of the industry had, during the current quarter, exceeded its allotment. Under the new quota, the proportion assigned Germany remains unchanged, but the tonnage allotment is materially enlarged. There was no change voted in over-production penalties and no action was taken to prolong the existence of the entente beyond the expiration date, Oct. 1, this year. The next meeting will be held in Vienna the middle of June.

Reinforcing Steel

Pennsylvania Highway Bridge Will Take 4000 Tons

AWARDS of 5900 tons reported placed during the last week included no projects of outstanding size. New pending jobs call for 6800 tons, the largest being a bridge across the Susquehanna River at Columbia, Pa., which will take 4000 tons. Awards follow:

BOSTON, 125 tons, garage, to Kalman Steel Co.

NEW YORK, 550 tons, foundation for Holland Plaza building; from Shroder & Koppel, Inc., general contractors, to Carroll-McCreary Co., Inc.

NEW YORK, 250 tons, subway section; from J. F. Cogan Co., general contractor, to Concrete Steel Co.

WHITE PLAINS, N. Y., 175 tons, addition to Westchester County Community Building, to Carroll-McCreary Co., Inc.

GREAT NECK, N. Y., 100 tons, building for New York Telephone Co., to Carroll-McCreary Co., Inc.

PORT RICHMOND, N. Y., 500 tons, approach for Kill van Kull bridge; from Arthur McMullen Co., general contractor, to Truscon Steel Co.

JERSEY CITY, 500 tons, ramp garage, to Truscon Steel Co.

BERGENFIELD, N. J., 200 tons, disposal plant, to Concrete Steel Co.

CELERON, N. Y., 100 tons, school, to a Buffalo bidder.

CINCINNATI, 675 tons, Cincinnati & Suburban Bell Telephone Co. building, to Pollak Steel Co.

DALLAS, TEX., 400 tons, building for Sears, Roebuck & Co., to Laclede Steel Co.

OAK PARK, ILL., 100 tons, building for Marshall Field & Co., to Barton Spiderweb System.

ROCKTON, ILL., 120 tons, bridge, to American System of Reinforcing.

SPRINGFIELD, ILL., 400 tons, roadwork, to Calumet Steel Co.

ROCKFORD, ILL., 185 tons, Republic Building, to Olney J. Dean & Co.

LOS ANGELES, 400 tons, apartment building at 561 North Rossmore Avenue, to Blue Diamond Co.

LOS ANGELES, 500 tons, office building, Wilshire Boulevard and St. Andrews Place, to unnamed bidder.

SANTA MONICA, CAL., 380 tons, office building, Third Street and Santa Monica Avenue, to unnamed bidder.

EVERETT, WASH., 125 tons, City Hall, to Pacific Coast Steel Co.

SEATTLE, 150 tons, office building, Forty-fifth Street and Brooklyn Avenue, to Pacific Coast Steel Co.

OLYMPIA, WASH., 100 tons, bridge approaches, Pasco-Kennewick bridge, to Northwest Steel Rolling Mills.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BOSTON, 300 tons, Boston Elevated Railway Co., Dorchester loop extension.

CAMBRIDGE, MASS., 200 tons, Houghton & Mifflin Co. plant.

NEW YORK, 800 tons, warehouse in Whitlock Avenue for Sachs Quality Furniture, Inc.

NEW YORK, 100 tons, Floyd Bennett Airport on Barren Island; bids March 22.

TINERWALD, N. J., 350 tons, hotel.

COLUMBIA, PA., 4000 tons, Lincoln Highway bridge over Susquehanna River; James B. Long, Norristown, Pa., architect.

BIRMINGHAM, 400 tons, Jefferson County Courthouse.

CINCINNATI, 100 tons, building for Sisters of Mercy.

MILWAUKEE, tonnage being estimated, County Courthouse.

GRAND RAPIDS, MICH., tonnage not stated, sewage disposal plant; Cope & Fisher, engineers.

BLOOMINGTON, ILL., 200 tons, sewage treating plant; J. L. Simmons Co., Bloomington, general contractor.

OAK PARK, ILL., 220 tons, Oak Leaves apartment building.

CHICAGO, 152 tons, store and hotel at 111 West Division Street.

CHICAGO, tonnage being estimated, department store at Green and Peoria Streets; A. S. Alschuler, architect.

CHICAGO, tonnage not stated, building for Northwestern Trust & Savings Bank.

CHICAGO, tonnage being estimated, factory building for Silver, Marshall, Inc.; plans prepared by E. Russell.

The Detroit branch of the Carborundum Co., Niagara Falls, N. Y., is now occupying its new building at 2759 East Grand Boulevard, Detroit.

Non-Ferrous Metal Markets

Copper Market Chaotic at 22 Cents, Tin Quiet But Higher, Lead Advanced and Active, Zinc Strong

NEW YORK, March 19.

Copper.—Not even during the period prior to the fixing of prices by our Government during the war was the copper market in any more chaotic a state than it is today. Within the week quotations have advanced 2c. per lb. and higher prices are quite possible and even predicted. In fact, a runaway market is almost here and producers are considerably worried. Some of them are either not selling at all or are apportioning limited

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Mar. 19	Mar. 18	Mar. 16	Mar. 15	Mar. 14	Mar. 13
Lake copper, New York.....	22.12½	21.12½	21.12½	21.12½	21.12½	21.12½
Electrolytic copper, N. Y.*.....	21.75	20.75	20.75	20.25	20.25	20.25
Straits tin, spot, N. Y.	49.50	49.62½	...	48.87½	48.62½	48.50
Lead, St. Louis.....	7.37½	7.17½	7.15	7.15	7.15	7.15
Lead, New York.....	7.50	7.25	7.25	7.25	7.25	7.25
Zinc, East St. Louis.....	6.35	6.35	6.35	6.35	6.35	6.35
Zinc, New York.....	6.70	6.70	6.70	6.70	6.70	6.70

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

amounts, with one or two seriously considering the rationing of their available supply. Consumers will take almost anything they can get. Some purchasing agents are asking for supplies at the producer's price. Such metal as has been sold has been almost entirely for July delivery and urgent inquiries for August metal have been turned down. Orders were taken today for electrolytic copper at 22c., delivered in the Connecticut Valley, but some producers took orders this morning with the price to be named later in the day. Opinions differ as to whether the electrolytic capacity of the country is equal to the present rate of consumption or demand. Some large interests claim that it is and it is contended that, if consumers could be brought to realize this, there would be an end to their

bidding up the market on themselves. Most producers have no metal for sale this side of July, but it is generally conceded that all the metal for July delivery to domestic consumers has not been sold. As to foreign consumers, they also are clamoring for metal and 3,000,000 lb. was sold yesterday at 21.25c., c.i.f. usual European ports. Today the price was advanced to 22.25c. for foreign delivery, with demand heavy. Very little metal beyond May has been sold for export. One custom smelter states that it is selling metal for the usual deliveries each day at the prevailing average price. Lake copper is also higher at 22c. to 22.12½c., delivered, with sales made at these levels. It is reported that one large American company, deeply interested in the consumption and uses of copper, has instructed its

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	51.50c. to 52.50c.
Tin, bar.....	53.50c. to 54.50c.
Copper, Lake.....	23.00c.
Copper, electrolytic.....	22.75c.
Copper, casting.....	22.50c.
Zinc, slab.....	7.50c. to 8.00c.
Lead, American pig.....	8.00c. to 8.50c.
Lead, bar.....	10.00c. to 10.50c.
Antimony, Asiatic.....	11.50c. to 12.50c.
Aluminum No. 1 ingots for re-melting (guar'nt'd over 99% pure).....	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy.....	24.00c. to 25.00c.
Babbitt metal, commerc'l grade.....	30.00c. to 40.00c.
Solder, ½ and ½.....	32.25c. to 33.25c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	54.00c.
Tin, bar.....	56.00c.
Copper, Lake.....	22.13c.
Copper, electrolytic.....	22.00c.
Copper, casting.....	21.75c.
Zinc, slab.....	8.00c.
Lead, American pig.....	7.90c. to 8.00c.
Lead, bar.....	10.00c.
Antimony, Asiatic.....	16.00c.
Babbitt metal, medium grade.....	19.50c.
Babbitt metal, high grade.....	58.00c.
Solder, ½ and ½.....	34.00c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass.....	26.00c. to 27.00c.
Copper, hot rolled, base sizes.....	29.75c. to 30.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	33.00c. to 34.00c.
Seamless Tubes—	
Brass.....	30.87½c. to 31.87½c.
Copper.....	32.00c. to 33.00c.
Brazed Brass Tubes.....	34.00c. to 35.00c.
Brass Rods.....	23.75c. to 24.75c.

From New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks.....	10.00c. to 10.50c.
Zinc sheets, open.....	11.00c. to 11.50c.

Non-Ferrous Rolled Products

Mill prices on brass and copper products were advanced in amounts ranging from ½c. to 1c. on March 16. Lead full sheets have been quoted at 11c. to 11.25c. since March 6, and zinc sheets, at 9.75c. since July 30, 1928.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products. Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass.....	24.87½c.
Copper, hot rolled.....	30.75c.
Zinc.....	9.75c.
Lead (full sheets).....	11.00c. to 11.25c.
Seamless Tubes—	
High brass.....	29.75c.
Copper.....	32.12½c.
Rods—	
High brass.....	22.62½c.
Naval brass.....	25.25c.
Wire—	
Copper.....	23.87½c.
High brass.....	25.37½c.
Copper in Rolls.....	29.75c.
Brazed Brass Tubing.....	32.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide.....	33.00c.
Tubes, base.....	42.00c.
Machine rods.....	34.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	17.00c.	19.00c.
Copper, hvy. and wire.....	16.25c.	17.75c.
Copper, light and bottoms.....	14.00c.	15.50c.
Brass, heavy.....	9.75c.	11.50c.
Brass, light.....	8.25c.	9.50c.
Hvy. machine composition.....	13.25c.	15.00c.
No. 1 yel. brass turnings.....	10.75c.	11.75c.
No. 1 red brass or compos. turnings.....	12.25c.	13.50c.
Lead, heavy.....	6.00c.	6.50c.
Lead, tea.....	5.00c.	5.50c.
Zinc.....	3.50c.	4.00c.
Sheet aluminum.....	13.50c.	15.50c.
Cast aluminum.....	12.00c.	14.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass.....	25.62½c.
Copper, hot rolled.....	31.75c.
Copper, cold rolled, 14 oz. and heavier.....	34.00c.
Zinc.....	10.00c.
Lead, wide.....	10.55c.
Seamless Tubes—	
Brass.....	30.50c.
Copper.....	33.12½c.
Brass Rods.....	23.37½c.
Brazed Brass Tubes.....	33.62½c.

research departments to investigate substitutes for copper.

Tin.—Sales of Straits tin for the week ended Saturday, March 16, were about 900 tons, practically all taken by consumers and mostly for nearby delivery. Yesterday about 200 tons changed hands, also taken by consumers. The market was excited, due to the gyrations of the markets in all metals in London, but today it is steadier and quieter, with spot Straits tin quoted at 49.50c., New York. London prices today were about £6 per ton higher than a week ago, with spot standard quoted at £224 17s. 6d., future standard at £225 10s. and spot Straits at £226 17s. 6d. The Singapore market today was £227. Sales in London today were the largest in some time at over 1200 tons of spot and futures, of which 1000 tons was futures. Eastern producers were selling freely.

Lead.—The American Smelting & Refining Co. raised its contract price today from 7.25c. to 7.50c., New York. London prices advanced sharply yesterday, and demand in this country is heavy. Sales were made today in the outside market at 7.37½c., St. Louis, mostly for April delivery, an advance over the 7.17½ level of yesterday. Consumers are asking for May metal, but producers are unwilling to sell.

Zinc.—Demand for prime Western zinc is much more active and sales have been heavy at 6.35c., East St. Louis, or 6.70c., New York. It is stated that very little metal is available at these prices, and higher levels are predicted. Ore prices were unchanged at the end of last week at

\$41, Joplin. Production for the week was 13,600 tons, against 13,000 tons the week before. Sales were 11,950 tons and shipments were 13,380 tons. Stocks of ore increased during the week about 3200 tons, bringing the total to approximately 18,600 tons.

Antimony.—The market is stronger, and Chinese metal is quoted at 9.75c., New York, duty paid, for all positions.

Nickel.—Wholesale lots of ingot and shot nickel are quoted unchanged at 35c. to 36c., per lb., respectively. Cathodes of electrolytic nickel are obtainable on the same basis as ingot and shot nickel.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is obtainable at 23.90c. per lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO.—Prices for copper, tin, lead and antimony are advancing sharply. Rapid changes in prices for copper are tending to check sales in the local market. Quotations for copper bearing grades of old metals are higher.

Prices per lb., in carload lots: Lake copper, 22c.; tin, 50.37½c.; lead, 8c.; zinc, 6.45c.; in less-than-carload lots: antimony, 10.62½c. On old metals we quote copper wire, crucible shapes and copper clips, 16.50c.; copper bottoms, 14.50c.; red brass, 14.12½c.; yellow brass, 11c.; lead pipe, 6c.; zinc, 3.62½c.; pewter, No. 1, 27.62½c.; tin foil, 27.62½c.; block tin, 40.12½c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

machine for regulating the temperature in the test room from normal temperature to 10 deg. below zero. Chimneys of various heights and diameters have been built in the boiler test room. These will provide various intensity of drafts for different sized boilers.

At the extreme south end of the building is a 40x80-ft. experimental foundry that will be used by the metallurgical department. This foundry will be equipped with a 41-in. diameter cupola, a 250-lb. hand and automatically controlled three-phase electric-arc melting furnace, a furnace for non-ferrous melts, and core ovens, tumbling mills as well as other auxiliary equipment.

The second floor will be occupied by the product engineering department, the plumbing engineering department and the metallurgical department. Space is provided in the product engineering department for chemical research work and a materials experimental engineering laboratory. The metallurgical department with chemical, physical and research laboratories will occupy a space 80x160-ft. Increased facilities are provided in the metallographic laboratory. Other features in the new building are a foundry sand testing laboratory, sample preparation room, and a heat treatment and alloy trial melt laboratory. A chemical and metallurgical library also forms part of the equipment.

Good Volume of Structural Steel Orders

WASHINGTON, March 19.—Fabricated structural steel orders in February totaled 213,042 tons, or 70 per cent of the capacity of 305,905 tons of the 199 firms reporting to the Department of Commerce, against 222,008 tons or 71 per cent of the capacity of 221 firms reporting in January. The computed tonnage in February was 269,500 tons, against 273,350 tons in January. Shipments were 238,700 tons or 62 per cent of capacity in February, compared with 281,050 tons or 73 per cent of capacity in January.

Except for January, the February computed tonnage of orders was the largest since last September. It compared with 265,650 tons a year ago, and was close to the average month of 1928. Shipments, on the other hand, made the lightest tonnage since last April, when an equal amount was recorded. They compare with only 173,250 tons a year ago.

The eighteenth annual meeting of the Metal Branch of the National Hardware Association of the United States will be held in Detroit, May 16 and 17, with headquarters at the Statler Hotel. George A. Fernley, 505 Arch Street, Philadelphia, is secretary.

American Radiator Profits Rise Slightly

The American Radiator Co., New York, had net profits in 1928, after all charges, of \$12,413,742, as compared with \$12,057,314 in 1927 and with \$12,476,485 in 1926. The aggregate volume of sales, according to the company's annual report, was the largest in its history, the increase over the preceding year having been 19 per cent. "Profits," the report continues, "did not increase proportionately with larger sales volume. While potential markets were greater, this industry, like many others, was subjected to keener competitive conditions, which lowered the price level, compelled greater intensification of marketing effort and increased selling expense."

In commenting upon the consolidation of the Radiator company and the Standard Sanitary Mfg. Co., Clarence M. Woolley, chairman of the former company, stated in the report: "The marketing of products through the same customer, with warehouses and selling branches in the same important industrial centers, presents an opportunity for these different but related industries substantially to enlarge their aggregate volume of business. It is hoped that the American

Radiator & Standard Sanitary Corporation, the new holding company, will be in active operation on or about April 1, if meanwhile, two-thirds of the stock of each company is placed with the depositaries provided."

Crane Co. Erects Building for Experimental Work

A new engineering building designed to give adequate facilities for major engineering and experimental work has been completed by Crane Co., Chicago. Thought has been given to ample space for various departments and the arrangement of their equipment. Maximum use of daylight and efficient electric lighting have been given special consideration. The building is of fireproof construction, two stories, and covers a ground area 80x500-ft. The second floor is spanned by trusses, eliminating all columns.

The first floor is divided into five sections to accommodate the plumbing testing department, exhibit material department, electrical department, boiler and radiator testing department and pattern storage. Radiator tests will be made in a cork-insulated room which is surrounded by a chamber containing a refrigerating

Fabricated Structural Steel

Awards of 52,800 Tons Include 12,350 Tons for Milwaukee Court House and 10,000 Tons for Oil Refinery

WITH 12,350 tons for a court house at Milwaukee and 10,000 tons for an oil refinery at East Chicago, Ind., awards placed during the last week totaled 52,800 tons. New projects, calling for 41,200 tons, include 20,000 for four ships for the Matson Navigation Co. on which bids have been taken at San Francisco. Awards follow:

WORCESTER, MASS., 700 tons, bakery, to Eastern Bridge & Structural Co.
 NEW HAVEN, CONN., 445 tons, Raleigh-Fitkin Memorial Hospital, to Levering & Garrigues Co.
 NEW YORK, 2850 tons, *Herald Tribune* building in West Forty-first Street, to Shoemaker Bridge Co.
 NEW YORK, 1850 tons, building for Young Men's Hebrew Association at Lexington Avenue and Ninety-second Street, to Paterson Bridge Co.
 NEW YORK, 150 tons, club house at 297 Dean Street, Brooklyn, and bank at Myrtle and Forest Avenues, Ridgewood, L. I., to George A. Just Co.
 NEW YORK, 150 tons, Public School 226, to Bethlehem Fabricators, Inc.
 BROOKLYN, 890 tons, building for Brooklyn College of Pharmacy at Lafayette Street and Nostrand Avenue, to George A. Just Co.
 NEWARK, N. J., 165 tons, highway bridge, to McClintic-Marshall Co.
 STATE OF NEW JERSEY, 250 tons, highway bridge in Union County, to unnamed fabricator.
 CHESAPEAKE & OHIO RAILWAY, 1100 tons, bridges, to Bethlehem Steel Co.
 CINCINNATI, 700 tons, highway bridge for Chesapeake & Ohio Railway, to Mount Vernon Bridge Co.
 EL PASO, TEX., 600 tons, power house for Stone & Webster, Inc., to Virginia Bridge & Iron Co.
 GADSDEN, ALA., 500 tons, rubber reclaiming plant for Goodyear Tire & Rubber Co., to McClintic-Marshall Co.
 THOMASTON, GA., 1000 tons, Martha mill of Goodrich Tire & Rubber Co., to Virginia Bridge & Iron Co.
 SOUTHERN PACIFIC RAILROAD, 300 tons, miscellaneous bridge work, to Virginia Bridge & Iron Co.
 BATON ROUGE, LA., 350 tons, oil refinery, to Virginia Bridge & Iron Co.
 TONAWANDA, N. Y., 400 tons, cabinet shop for Rudolph Wurlitzer Co., to Kellogg Structural Steel Co.
 DETROIT, 150 tons, factory building for Cadillac Motor Car Co., to Mahon Structural Steel Co.
 MILWAUKEE, 12,350 tons, County Court-house, to McClintic-Marshall Co.
 EAST CHICAGO, IND., 10,000 tons, new refinery for Empire Oil & Refining Co.: 6000 tons to Chicago Bridge & Iron Works, and 4000 tons to Graver Corporation.
 CHICAGO, 2700 tons, mill for Interstate Iron & Steel Co., to McClintic-Marshall Co.
 KANSAS CITY, MO., 1000 tons, two oil tanks for Magnolia Oil Co., to United Iron Works, local.
 OAKLAND, CAL., 100 tons, warehouse, First and Market Streets, to Moore Dry Dock Co.
 SAN FRANCISCO, 200 tons, apartment building, O'Farrell and Franklin Streets, to Golden Gate Iron Works.
 SAN FRANCISCO, 2500 tons, six coast guard cutters, to General Engineering & Dry Dock Co.
 SAN FRANCISCO, 710 tons, apartment building, Green and Leavenworth Streets, to Judson-Pacific Co.

SAN FRANCISCO, 370 tons, two apartment buildings, Eddy and Octavia Streets, to McClintic-Marshall Co.
 SAN FRANCISCO, 6000 tons, plates, 20-in. pipe line for Pacific Gas & Electric Co., to Western Pipe & Steel Co.
 SAN FRANCISCO, 200 tons, plates, tanks for Southern Pacific Co., to Western Pipe & Steel Co.
 LOS ANGELES, 2000 tons, plates, five 134,000-bbl. tanks for Rio Grande Oil Co., to Western Pipe & Steel Co.
 LOS ANGELES, 1200 tons, plates, three 134,000-bbl. tanks for Richfield Oil Co., to Western Pipe & Steel Co.
 LOS ANGELES, 225 tons, steel joists, Samson Tire & Rubber Co. plant, to Consolidated Steel Corporation.
 SPOKANE, WASH., 175 tons, hotel addition, to Minneapolis Steel & Machinery Co.
 PUYALLUP, WASH., 100 tons, grandstand for State Fair Grounds, to Isaacson Iron Works.
 PORTLAND, ORE., 105 tons, Malheur River bridge; general contract to J. J. Badraun, Portland; steel to unnamed bidder.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

STATE OF VERMONT, 500 tons, bridges.
 PORTLAND, ME., 500 tons, Maine General Hospital.
 NEW YORK, 8000 tons, subway section 7, route 109; Hart & Early Co., Inc., low bidder on general contract.
 NEW YORK, 4100 tons, warehouse in Varick Street.
 YORK, PA., 300 tons, bridge over Susquehanna River on Lincoln Highway; James B. Long, Norristown, Pa., architect.
 PENNSYLVANIA RAILROAD, 400 tons, bridges.
 MUNCY, PA., 1500 tons, bridge for Reading Railroad.
 PHILADELPHIA, 500 tons, power plant for Atwater Kent Mfg. Co.
 STATE OF VIRGINIA, 500 tons, highway bridges.
 PENNSYLVANIA RAILROAD, 2000 tons, bridge at Denison, Ohio; bids taken.
 TOLEDO, 900 tons, junior high school; bids taken and rejected, job to be re-advertised.
 CINCINNATI, 250 tons, building for Sisters of Mercy.
 DAYTON, OHIO, 2200 tons, building for National Cash Register Co.; bids taken.
 LOUISVILLE, KY., 150 tons, eight pontoon bridges, Midland Barge Co., low bidder.
 LOUISVILLE & NASHVILLE RAILROAD, 600 tons, bridges.
 STATE OF TENNESSEE, 1500 tons, two highway bridges.
 MONROE, MICH., 3600 tons, revised figures, mill building for Newton Steel Co.
 CHICAGO, tonnage being estimated, gas holder for Peoples Gas, Light & Coke Co.
 CHICAGO, 2500 tons, revised inquiry for cable plant for Western Electric Co.

CHICAGO, 600 tons, Von Steuben public school; Retter Brothers, low bidders.
 MILWAUKEE, 1100 tons, hotel for Freuler Hotel Corporation.
 WEST ALLIS, WIS., 300 tons, theater.
 SEATTLE, 1505 tons, West Spokane Street bridge; General contract to General Construction Co.
 ELLENSBURG, WASH., 1691 tons, plates, siphon for North Branch Canal project; Commercial Boiler Works, low bidder.
 SAN FRANCISCO, 20,000 tons, four ships for Matson Navigation Co.; bids opened.
 SAN FRANCISCO, 200 tons, apartment building, Pine and Monroe Streets; bids being taken.

Railroad Equipment

Inquiries for 3000 Freight Cars—Orders for 1050

INQUIRIES during the week totaled 3000 freight cars, including 1000 to 2500 for the Chicago & North Western and 500 for the Chesapeake & Ohio. Passenger car inquiries were also large. The New York Central is asking for bids on 70 passenger train cars and the New York, New Haven & Hartford has authorized the purchase of 174 passenger train units. An order for 300 tank cars was placed by the Union Tank Car Co. and the Chicago, Burlington & Quincy will build 750 hopper cars in its own shops. Details of the week's business follow:

Union Tank Car Co. has ordered 300 tank cars from American Car & Foundry Co.

Chicago & North Western is inquiring for 1000 to 2500 box cars. It has ordered 25 locomotives from the Baldwin Locomotive Works.

Chicago, Burlington & Quincy is to build 750 hopper cars in its own shops.

American Bridge Co. has ordered 10 flat cars from Koppel Industrial Car & Equipment Co.

Cities Service Tank Line, New York, has ordered five tank cars from General American Tank Car Corporation.

American Oil Co., Baltimore, has ordered four tank cars from General American Tank Car Corporation.

New York Central is inquiring for 10 dining, 10 passenger and baggage, 20 baggage and 30 milk cars.

Delaware & Hudson is inquiring for three mail and baggage and mail cars.

Chesapeake & Ohio will buy 500 70-ton hopper cars.

New York, New Haven & Hartford has authorized purchase of 90 coaches, 10 combination coaches, 15 mail cars, six dining cars, 20 gasoline-electric cars, three multiple-unit cars, six multiple-unit trailers and 24 trailers for gasoline-electric cars.

Southern Pacific will buy 21 gas-electric motor cars.

Chicago, Indianapolis & Louisville will buy 10 Mikado locomotives.

Illinois Central has ordered four electric locomotives from Westinghouse Electric & Mfg. Co.

Akron & Barberton will buy three locomotives.

Chicago & Illinois Midland is in market for two 2-8-4 or two 2-10-2 type locomotives.

Machine Tool Builders Merge

New Britain-Gridley Machine Co. Will Continue Chucking and Screw Machine Lines

CONSOLIDATION of the New Britain Machine Co., New Britain, Conn., and the Gridley Machine Co., Hartford, was completed March 15. The new concern, to be known as the New Britain-Gridley Machine Co., takes over the entire business of the Gridley company and the machine tool business of the New Britain company. The New Britain Machine Co. will con-



G. O. GRIDLEY

tinue to operate as manufacturer of screw machine products, pressed metal parts, shop furniture, socket wrench sets and mortising machines and supplies.

Officers of the New Britain-Gridley company are:

President: Herbert H. Pease, formerly president New Britain Machine Co.

Vice-Presidents: George O. Gridley, Earl H. Wheeler and Donald H. Montgomery, formerly president, vice-president and secretary-treasurer respectively of the Gridley Machine Co.; and Ralph S. Howe and Edward L. Steinle, formerly assistant treasurer and machinery sales manager respectively of the New Britain Machine Co.

Secretary: Robert S. Brown, formerly secretary of the New Britain Machine Co.

Treasurer: Ralph S. Howe.

Directors (in addition to the officers listed above): John H. Goss, vice-president and general manager of the Scovill Mfg. Co., Waterbury, Conn.; Robert T. Frisbie, vice-president New Britain Machine Co.; F. G. Vibberts, president New Britain Trust Co., and P. B. Stanley, formerly vice-president Stanley Works, New Britain.

The offices and manufacturing plant of the new company will be those formerly used by the New Britain Machine Co.

Mr. Pease, who will be the active

head of the concern, is well known throughout the machine tool business.

Mr. Gridley's connection with the machine tool business covers a period of more than 30 years, his name being widely known as a designer of screw machines. He was president of the Windsor Machine Co., resigning in 1915. Early in 1927 he organized the Gridley Machine Co., to build a new automatic chucking machine, the single-spindle model of which was described in *THE IRON AGE* of Feb. 2, 1928. This machine is of work-revolving type and features simplicity of tool set-up and hydraulic chucking. Mr. Gridley will devote himself entirely to designing and building automatic chucking and screw machines such as offered previously by the New Britain and the Gridley companies.

Donald H. Montgomery had been associated with Mr. Gridley since the organization of the Gridley company. He has had extensive experience in the automatic screw machine field, both in sales and engineering. He attended the Massachusetts Institute of Technology and is a member of the American Society of Mechanical Engineers.

Earl H. Wheeler's experience in the design, manufacture and tooling of automatic screw machines covers a period of 20 years.

Robert S. Brown was secretary of the New Britain Machine Co. since its formation, and was responsible for the design of the entire line of Super Production automatic chucking and screw machines built by that company.

Edward L. Steinle, who continues as sales manager, has been identified with the New Britain company for several years, and Ralph S. Howe, treasurer, has long been affiliated with the same company in a financial capacity. Mr. Howe's experience includes the engineering as well as the financial side of the business.

John H. Goss is chairman of the board of directors of the new company. In addition to being vice-president and general manager of the Scovill Mfg. Co., he is chairman of the board of the New Britain Machine Co.

Hearings in Tutein-Hudson Valley Case Resumed

Hearings in the arbitration proceedings between E. Arthur Tutein, Inc., Boston, and the Hudson Valley Coke & Products Corporation, Troy, N. Y., which were adjourned in December, were resumed March 14 in the trial room of the New York Bar Association's building, 42 West Forty-fourth Street, New York, and continued through March 16, when they were adjourned until March 21. It is believed that the hearings will be

concluded by March 23, following which an early decision is expected. The question at issue is an alleged breach of contract for the sale of pig iron and coke. United States Senator Wagner of New York is serving as arbitrator for the Hudson Valley company, while Sherman Whipple, Boston, is arbitrator for E. Arthur Tutein, Inc. The third arbitrator is Louis K. Comstock of L. K. Comstock & Co., engineers, New York.

Crucible Patents Purchased by Krupp Nirosta

H. G. Batcheller, president Krupp Nirosta Co., Inc., Watervliet, N. Y., has announced the purchase by that corporation of the three Johnson patents covering the analysis and manufacture of Rezilal corrosion and heat-resisting steel from the Crucible Steel Co. of America, the latter having acquired an interest in Krupp Nirosta Co., Inc. This purchase brings together under Krupp Nirosta control patents affecting the production of heat- and corrosion-resisting steels in this country, the Krupp Nirosta Co. having previously acquired some of the Ludlum patents and the Krupp heat-treating patents which cover Nirosta steels.

The Crucible Steel Co. of America is now licensed to manufacture under all patents controlled by Krupp Nirosta Co. In addition to Crucible Steel Co. of America, other licensees include Central Alloy Steel Corporation, Ludlum Steel Co., Babcock & Wilcox Tube Co., Firth-Sterling Steel Co., Spang, Chalfant & Co., Lukens Steel Co., and Wallingford Steel Co. These automatically receive rights to manufacture or fabricate under the Johnson patents.

Wright Machine Co. Reorganized

The business and property of the Wright Machine Co., Worcester, Mass., manufacturer of machine screw products and other metal specialties, has been bought by Archibald R. Lemieux, who has been president since 1924, and a group of associates who have organized a corporation under a Massachusetts charter with the same name as the old Delaware corporation. The new company has capital consisting of 2000 shares of preferred stock of \$100 par value and 4000 shares of common stock of no par value.

The officers of the company are Archibald R. Lemieux, president; W. Vernon Thomas, vice-president, and Louis F. Weber, treasurer. The officers and Henry A. Benoit, president, and a director of the Felter Co.; George F. Wright, president George F. Wright Steel & Wire Co.; Charles E. Hildreth, former manager of the National Machine Tool Builders Association, all of Worcester, and George A. Morin, Boston, are directors.

PERSONAL

JAMES A. HENRY, who has been general manager of sales, strip steel sheet department, Weirton Steel Co., Weirton, W. Va., has been made assistant vice-president. He remains in the sales department with more general duties. His successor is W. R. CUNNICK, and G. D. LUMMIS, JR., who has been in the Detroit office of the American Rolling Mill Co., has joined the Weirton company as assistant general manager of sales in the strip steel sheet department.

★ } GEORGE R. HANN has been elected a director of the Mackintosh-Hemphill Co., Pittsburgh, succeeding JOHN CHALFANT, who has resigned. Other directors and the officers of the company have been reelected.

R. D. KLEBES, for the last seven years assistant purchasing agent for the American-La France & Foamite Corporation, Elmira, N. Y., has been made purchasing agent of that company.

JOHN GRILLI, recently identified with the South works, Illinois Steel Co., Chicago, has become associated with H. A. Brassert & Co., Chicago, consulting engineers.

R. W. COOK, factory manager, and BROWN JOYCE, general sales manager of the Wallace Barnes Co., Bristol, Conn., have been elected vice-presidents of that company, and J. E. ANDREW, general manager, has been named assistant treasurer.

ALBERT C. MARBLE, Curtis & Marble Machine Co., Worcester, Mass., was elected president of the Worcester branch of the National Metal Trades Association at its annual meeting on March 13. FRED S. MORTON, Matthews Mfg. Co., was made vice-president; DONALD TULLOCH, secretary, and WILLIAM ARTER, Arter Grinding Machine Co., treasurer. ROGER N. HEALD, Heald Machine Co.; HOWARD W. DUNBAR, Norton Co.; PHILIP M. MORGAN, Morgan Construction Co.; J. J. ADAMS, J. J. Adams Co.; W. B. SMITH, James Smith Co.; H. H. WRIGHT, M. S. Wright Co.; FRED W. MACINTYRE, Reed-Prentice Corporation; and C. O. SMITH, O. S. Walker Co., all of Worcester, and W. M. WHITNEY, Baxter D. Whitney Co., Winchendon, Mass.; ELLIOT J. McKNIGHT, L. G. McKnight Co., Gardner, Mass.; F. A. BALL, L. S. Starrett Co., Athol, Mass., and JOHN C. SPENCE, Universal Boring Machine Co., Hudson, Mass., were made members of the executive board.

W. J. MILLER, formerly president Northwestern Steel & Iron Co., Minneapolis, has been appointed vice-president of the Foote Brothers Gear

& Machine Co., Chicago, and will have direct charge of the manufacturing and sales in the new road machinery division.

BURTON H. PEASE, for 20 years chief inspector at the Farrell, Pa., works, Carnegie Steel Co., has been transferred to the general offices at Pittsburgh in the metallurgical department.

W. L. MACRAE is severing his connection with Henry Prentiss & Co., New York, to engage in machine tool sales on his own account. At present he will represent the Oilgear Co., Milwaukee, and the Keller Mechanical Engineering Corporation, Brooklyn, in the Syracuse, N. Y., territory, and will have headquarters at 523 Salt Springs Road, Syracuse.

H. W. STANDART, Northern Engineering Works, Detroit, was elected chairman of the Electric Hoist Manufacturers Association at the annual meeting held in New York on March 14. J. G. WORKER, American Engineering Co., Philadelphia, was elected vice-chairman.

R. L. SITTINGER has been appointed representative in New England for the Northern Equipment Co., Erie, Pa., in the sale of the Copes system of boiler feed control. He succeeds HARRY H. LEATHERS, with whom he has been associated for some time and who is retiring to devote his entire time to other business interests. Mr. Sittinger's headquarters will be at 303 Chamber of Commerce Building, 80 Federal Street, Boston.

A. P. FOX, formerly in the office of L. E. RITTER, engineer, Chicago, has joined the sales engineering department of the Chicago office of the Bethlehem Steel Co.

MYRON A. LOCKE has been appointed sales manager of the Esline Steel Building Corporation, Oconomowoc, Wis., manufacturer of sheet metal garages, cottages and other portable and stationary steel structures.

J. A. DOYLE, vice-president W. S. Rockwell Co., New York, spoke at a meeting of the Rhode Island chapter of the American Society for Steel Treating, held at Providence on March 20. His subject was "Industrial Heating Practice and Fuel Problems."

JACKSON BROWN, JR., has been appointed representative in Colorado, Utah, Wyoming and northern New Mexico for the Roller-Smith Co., 233 Broadway, New York, maker of electrical instruments. His headquarters are at 701 Kittridge Building, Denver, Colo.

T. D. LYNCH, who has been nominated for president of the American Society for Testing Materials, is consulting engineer for the Westinghouse Electric & Mfg. Co., East Pittsburgh. Mr. Lynch represented the Society at the reorganization meeting of the International Society for Testing Materials held at Amsterdam, in 1927. At this meeting he gave the opening address, his subject having been "Materials Testing As a Stimulus to Research." He has been a member of the executive committee of the Society for the past four years, and for the past two years has been vice-president.

E. E. BOONE has been appointed gearing apparatus sales manager for the Westinghouse Electric & Mfg. Co., East Pittsburgh, succeeding J. E. MULLEN, who has resigned. Mr. Boone was graduated from the University of Illinois in 1911 and has since been associated with the Westinghouse company. For the past four years he has been in the mixed apparatus sales division. He will be located at the R. D. Nuttall works of the company in Pittsburgh.

F. C. CHANDLER, formerly president of the Chandler Motor Co., Cleveland, will establish a chromium plating works in the Pennsylvania warehouse, Ashland Road, Cleveland. The plant will do plating for the Cleveland plant of the Hupp Motor Car Corporation and for other manufacturers.

JOHN H. SCHWAB, formerly with the Northwestern Foundry Co., Chicago, has been made superintendent of the Plano Foundry Co., Plano, Ill., succeeding JACK HAINES.

R. J. S. PIGOTT, for three years mechanical engineer with Stevens & Wood, Inc., 20 Pine Street, New York, engineer and constructor, and later consulting engineer with the Public Service Corporation of New Jersey, Production Co. and the Smoot Engineering Corporation, has returned to the Stevens & Wood organization as consulting mechanical engineer. For several years Mr. Pigott has been chairman of the A. S. M. E. research committee. In his new association he will devote his time mainly to the power and production problems of industrial companies.

STUART NARAMORE, for the last six years sales manager with Andrew C. Campbell, Inc., Bridgeport, Conn., manufacturer of nibbling machines, has resigned and on April 1 will become associated with the Triplex Machine Tool Co., Waltham, Mass., and will represent the company in Connecticut in machine tool sales.

PAUL LLEWELLYN, president and general manager of the Interstate Iron & Steel Co., Chicago, sailed on March 7 for an extended tour of Europe.

Steel Profits Rise With Volume

(Concluded from page 820)

for the year just past having been 82 per cent of capacity, as compared with 73.6 in 1927 and 81.1 in 1926. Operations during 1928 were also at a well sustained rate, having averaged 79.6 per cent of capacity in the first quarter, 82.5 per cent in the second, 82.3 per cent in the third and 83.7 per cent in the last.

Production of the principal classes of materials also reached record proportions in 1928. The output of pig iron and ferromanganese amounted to 4,722,136 tons, as compared with 4,315,509 in 1927 and 4,551,353 in 1926. Steel ingot production totaled 6,478,981 last year, 5,590,754 in the preceding year and 6,162,759 in 1926, while the production of rolled and finished products amounted to 4,542,385 in 1928, 4,006,612 in 1927 and 4,337,957 in 1926.

The value of orders booked during 1928 amounted to \$295,209,483, as against \$280,199,101 in 1927 and \$283,707,678 in 1926, while unfilled orders on hand Dec. 31, 1928, amounted to \$59,040,202, as compared with \$58,609,006 one year before and \$49,912,796 on Dec. 31, 1926. These orders included 667,787 tons of rolled and finished products at the end of 1928, as compared with 657,919 in 1927 and 567,723 in 1926.

Cash expenditures for additions and improvements to properties during 1928 amounted to \$19,943,804, as compared with \$30,530,306 in the previous year. The estimated cost of completing the construction authorized and in progress as of Dec. 31, 1928, is \$10,300,000. "The large rebuilding and modernization program referred to last year," says the report, "was completed in 1928. The cost of additions and improvements to properties made by the corporation in the years 1923 to 1928, inclusive, totaling \$157,032,259, was paid largely out of earnings and depreciation, maintenance and other reserves, supplemented by the proceeds of \$35,000,000 par value 7 per cent preferred stock sold in 1926. Between March 30, 1923, when the Midvale-Cambria purchase was consummated, and Dec. 31, 1928, earnings in excess of dividends paid totaled \$46,516,977 and the net increase in the depreciation and other reserves amounted to \$99,244,821.

"The rated steel capacity of the corporation," the report continues, "was increased to 8,000,000 tons annually and its pig iron capacity to 6,960,000 tons annually, effective in both cases on Jan. 1, 1929. Both increases resulted from improvements and more modern designs incorporated in old furnaces which have been rebuilt."

The average number of employees in 1928 was 62,039, as compared with 61,072 in 1927 and 66,072 in 1926. Total wages were \$114,437,334 in 1928, \$111,193,699 in the previous year and \$121,891,931 in 1926.

OBITUARY

EUGENE J. MCCARTHY, president of Beals, McCarthy & Rogers, Buffalo, whose death on March 7 was mentioned in THE IRON AGE last week, went to Buffalo in 1888 from Auburn, N. Y., where he had been identified with a hardware distributing firm. In 1890 he became associated with Beals & Brown, who were then engaged in the hardware and warehouse business. When he was elected presi-

pany 47 years and was one of its directors.

WALTER C. ARTHURS, president and a director of the Mount Vernon Car Mfg. Co., Mount Vernon, Ill., died recently. He was a director of the Association of Manufacturers of Chilled Car Wheels.

JOHN E. PILCHER, until 1905 vice-president Simmons Hardware Co., St. Louis, and later vice-president Baldwin Forging & Tool Co., Columbus, Ohio, died recently in St. Louis, aged 84 years. He was born in Dover, England, and went to St. Louis when he was 15 years of age. There he became associated with Wilson, Levering & Waters, which through later changes became the Simmons Hardware Co. He had been vice-president of the old Business Men's League, now the Chamber of Commerce of St. Louis.

WILLIAM H. VOGEL, president Wisconsin Machinery & Mfg. Co., Milwaukee, maker of motor parts, died on March 10, in his eighty-fourth year. In recent years he had been active in the company only as a director and in an advisory capacity.



E. J. MC CARTHY

dent in 1917 the firm's name became Beals, McCarthy & Rogers. Although this business had remained Mr. McCarthy's chief interest until his death, he was also vice-president of McCarthy Brothers & Ford, Buffalo, a wholesale electrical supply house. He was also a director in the Manufacturers & Traders-Peoples Trust Co. and in the Irish-American Savings & Loan Association, both of Buffalo. He had taken an active part in the trade association work and was formerly president of the American Steel and Heavy Hardware Association.

JOHN W. HAYES, president of the Hayes-Custer Stove & Furnace Co., Bloomington, Ill., died on March 14, aged 70 years. He had been president of the stove company since its organization in 1886.

H. C. BELLVILLE, vice-president and a director of the Rothacker Industrial Films, Inc., St. Louis, died recently in that city. He was formerly vice-president and a director of the Commonwealth Steel Co., Granite City, Ill.

WILLIAM H. CHASE, for the past 10 years in charge of sales on the Pacific Coast of the Cleveland Hardware Co., Cleveland, died at his home in Los Angeles on March 12, aged 73 years. He had been connected with the com-

Large Sponge Iron Exports from Sweden in 1928

Statistics for 1928 of the foreign trade of Sweden disclose the interesting fact that exports of sponge iron last year were 10,300 tons as compared with 7100 tons in 1927. Some idea of the expansion of the industry may be obtained by the further fact that the exports of this commodity in 1924 were only 2700 tons, and in 1913 the export sales were practically nothing.

The number of electric hoists ordered during February increased 40.71 per cent over the previous month, according to the members of the Electric Hoist Manufacturers Association, 165 Broadway, New York. The value of such orders increased 36.97 per cent, as compared with January, while shipments were 5.74 per cent less in February than in the preceding month.

Two hot blast stoves of the Algoma Steel Corporation, Sault Ste. Marie, Ont., are to be relined and equipped with pressure burners and chimney valves. The work will be done under the supervision of the Freyn Engineering Co., Chicago, which will supply the burners and valves.

Machinery Markets and News of the Works

Demands From Many Sources

Machine Tool Industry Continues at High Rate of Activity as Orders Pour In from Diversified Lines

WITH March about two-thirds gone, it is apparent that it may establish itself as the eleventh consecutive month in which machine tool sales, as gaged by reports to the National Machine Tool Builders' Association, have exceeded those of the month previous. Some manufacturers have booked less business so far this month than in the same number of days in February, but this is thought to be largely the result of long-delayed deliveries, which in a few cases are extended as far as August or September. A leading manufacturer of turret lathes, on the other hand, sold as many machines in the first half of March as it did in all of February, although its business last month also was heavy.

Demand continues to come from many industries. For example, orders and inquiries of more than average size in the past week came from such buyers as railroads, automobile and automobile parts makers, airplane and airplane parts makers, tractor builders, an electrical manufacturer, a pump manufacturer, an office supply company, a can manufacturer, radio manufacturers, and even from the newest of industries—television equipment manufacturing.

The Jenkins Television Co., now established in a plant in Jersey City, bought in a small way for initial production of its apparatus. The Eclipse Machine Co., East Orange, N. J., maker of starters for airplanes, was again a buyer, having added to its large purchases of a few weeks ago. The General Electric Co. has closed on practically all of its recent list of about 75 tools for refrigerator and radio departments. The Worthington Pump & Machinery Corporation bought a number of tools for its works at Harrison, N. J.

In the Chicago market, the require-

ments of tractor builders are prominent in current buying. A large purchase has been made by a manufacturer of office supplies in that district, while a can manufacturer bought a number of tools. In the Cleveland-Detroit district, inquiry from automobile and parts manufacturers is not as active as recently, but electrical and radio equipment manufacturers are buying.

Three railroads have come into the market. The Chesapeake & Ohio has issued an inquiry for about a dozen tools and the Baltimore & Ohio

and Big Four will each buy several.

Employment in Ohio machine tool plants is gaining. Reports of 16 companies to the Bureau of Business Research of Ohio State University show that the number of wage earners in February was 1 per cent larger than in January and was 47 per cent greater than in February, 1928.

Commenting on the situation in its current bulletin, the National Machine Tool Builders' Association says:

"There is nothing in sight at this time that would indicate any serious check to general business activities for the next three months. Even though there may be some slight recession in late spring and early summer business, as there generally is, we ought to be able to count on a good volume of business for the rest of the half year."

New York

NEW YORK, March 19.—The past week has brought continued activity in the machine tool market. The General Electric Co. has placed orders for most, if not all, of the 70 to 80 machines it recently inquired for, and there has been other substantial buying. The Eclipse Machine Co., East Orange, N. J., has bought 10 or 12 additional tools, it having purchased quite heavily some weeks ago. The Worthington Pump & Machinery Corporation ordered a number of tools for its plant at Harrison, N. J. The Jenkins Television Co., which is located in a factory at 346 Claremont Avenue, Jersey City, N. J., has bought in a small way for initial production of television equipment. The Board of Transportation of New York is expected to issue a list of tools soon for equipping a subway repair shop nearing completion in the Bronx. Orders so far this month have been at such a high rate that it now appears that the high totals of January and February will be surpassed.

Allied Die-Casting Corporation, Skillman Avenue, Brooklyn, has leased four-story factory, 100 x 180 ft., to be erected at Long Island City, and will occupy for new plant, to cost \$350,000 with equipment. Shampian & Shampian, 188 Montague Street, Brooklyn, are architects.

Victor Metal Products Corporation, 196 Diamond Street, Brooklyn, will soon take bids for two-story addition to cost about \$30,000 with equipment. Albert Kunz, 788 Manhattan Avenue, is architect.

Brunner-Winkle Aircraft Corporation, recently organized, will take over and operate company of same name, with plant at Glendale, L. I. New company has arranged for sale of 50,000 shares of stock, part of fund to be used for expansion. William E. Winkle is president.

Garford Motor Truck Co., Thirteenth Avenue and William Street, Long Island City, has filed plans for two-story service, repair and headquarters building, 100 x 215 ft., to cost about \$100,000 with equipment. Forigner & Gautier, 103 Park Avenue, New York, are architects.

Flushing-New York Airport, Inc., a subsidiary of Pioneer Aero Trade School, Inc., 1715 Broadway, New York, John J. Gallagher, treasurer, has acquired 260 acre tract at Flushing, L. I., and plans construction of airport, to be used primarily by parent organization in connection with training of aviation students. Project will include 15 hangars, machine and reconditioning shops, oil storage and distributing buildings and other units, to cost more than \$300,000 with equipment, excluding site.

American Machine & Foundry Co., Second Avenue and Fifty-sixth Street, Brooklyn, has purchased plant and business of American Oven & Machine Co., 615 South California Avenue, Chicago, manufacturer of ovens and baking machinery, and will continue as division of organization.

De Laval Separator Co., Poughkeepsie, N. Y., manufacturer of filters, clarifiers, separators, etc., will take bids in about 30 days for one and two-story foundry addition, to cost more than \$130,000 with equipment. S. H. Chadwick, 140 Cedar Street,

New York, is consulting engineer. Headquarters are at 165 Broadway, New York.

Franklin Kent Corporation, 88 Franklin Avenue, Brooklyn, is having plans drawn for two-story machine shop, to cost about \$45,000 with equipment. Koch & Wagner, 32 Court Street, are architects.

Stevens Mfg. Corporation, 46-48 East Houston Street, New York, manufacturer of radio equipment, has leased buildings at 40-48 Spring Street, Newark, totaling 40,000 sq. ft. floor space, for larger plant.

Yonkers Plumbing & Supply Co., 43 Dock Street, Yonkers, N. Y., has asked bids on general contract for one-story storage and distributing plant, with pipe-cutting and fitting shop, to cost about \$50,000 with equipment. George W. Kibitz, 410 East Tremont Avenue, New York, is architect.

Board of Education, Caldwell, N. J., is said to be planning installation of manual training equipment in three-story addition to Grover Cleveland high school, to cost \$450,000. Guilbert & Betelle, 24 Branford Place, Newark, are architects.

Gamon Meter Co., 296 South Street, Newark, manufacturer of water meters, has awarded general contract to Fatzler Co., 676 South Sixteenth Street, for two-story addition, to cost \$50,000 with equipment. Taylor & Knight, 60 Park Place, are engineers.

Wright Aeronautical Corporation, Paterson, N. J., is planning establishment of branch service, repair and reconditioning shops for its aircraft motors, including parts and replacements, at 26 different airports throughout country, entire project to cost over \$350,000. Wright company, through Richard F. Hoyt, chairman of board, has acquired substantial interest in Moth Aircraft Corporation, Lowell, Mass., and will be identified with management of that company in future. It has also secured American rights for manufacture of DeHavilland motor, used in Moth airplanes, and will start production of these units at Paterson works in near future.

Walter Kidde Co., 60 West Street, Bloomfield, N. J., manufacturer of fire extinguishers, parts, etc., has filed plans for one-story addition, to cost about \$50,000 with equipment.

Conveyors Construction Corporation, 257 Water Street, New York, is moving to larger plant at 463 Pearl Street. Company manufactures standard and special conveyors and systems. L. M. Bailey is president, W. A. Brown, secretary-treasurer.

Buffalo

BUFFALO, March 18.—Contract has been let by Continental Can Co., 1016 East Water Street, Syracuse, N. Y., to Fellows & McGrath, 207 Fellows Avenue, for extensions and improvements in two-story factory, to cost about \$55,000. Headquarters are at 1 Pershing Square, New York. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects and engineers.

Rockwood Products Corporation, Buffalo, care of Byron F. Lyth, 2 Goulding Avenue, recently formed by Mr. Lyth and associates, will establish local plant to manufacture gypsum building materials under special process controlled by Rockwood Corporation of America, Inc., St. Louis. Initial plant will cost about \$45,000 with equipment. Mr. Lyth is vice-president of new company; Charles L. Doelman, Buffalo, is president.

Kurtz-Chevrolet Corporation, 2301 Main

Street, Buffalo, Fred P. Kurtz, president, local representative for Chevrolet automobile, has awarded general contract to Otto Grupp Co., 618 Linwood Avenue, for one and two-story service, repair and garage building, to cost \$120,000 with equipment. Bacon & Lurkey, 997 Main Street, are architects.

Mollenberg-Betz Machine Co., 110 Washington Street, Buffalo, manufacturer of special machinery and parts, has purchased plant of Buffalo Tool & Supply Co., Henry and Charles Streets, with adjoining property. Three larger buildings on site will be improved for new plant, while smaller buildings will be razed to make way for new units later. Present business will be removed to new location and capacity increased. Henry J. Mollenberg is president.

Processing equipment, power, conveying and other machinery will be installed in two new manufacturing units at plant of Skenandoa Rayon Corporation, Utica, N. Y., for which fund of \$3,000,000 has been authorized. Plans will be drawn at once. Bleecher M. Crouse is president.

New England

BOSTON, March 18.—Sales of machine tools have dropped. Sellers of new tools are handicapped by deliveries, which on certain types extend to September. The largest individual sale reported the past week was for six lathes to a manufacturer of printing presses. Orders for lathes outnumber those for other tools. Two 600-lb. pneumatic drop hammers have been taken by an Indiana shop. Scarcity of good used tools is more pronounced than ever. Two large used horizontal boring mills was the outstanding individual purchase. Buying of used bench milling machines, small tool-room lathes, punches, and small hand presses is active. There are no inquiries suggestive of a list, yet the aggregate of one and two tool prospects is encouraging. Small tool makers are working to capacity and deliveries on certain types of cutting tools are quite extended.

General Fiber Box Co., West Springfield, Mass., will add about 20,000 sq. ft. floor space to its manufacturing units. Motors are needed. Company will also build a warehouse, 75 x 300 ft., for which a crane is required.

Park Mfg. Co., 47 Lagrange Street, Worcester, Mass., door checks and machine screw specialties, has been sold to Thomas Crabtree, Worcester Taper Pin Co., who formerly owned the business. Some equipment may be purchased.

J. R. Worcester & Co., 79 Milk Street, Boston, engineers, have plans for a one-story, 40 x 96 ft. manufacturing plant addition to be built by the Potter Press, 515 South Street, Waltham, Mass.

Plant of New England Annealing & Tool Co., 74 K Street, South Boston, was destroyed by fire March 15. Company has plans for temporary quarters for which equipment is needed.

New Britain Tool Mfg. Co., 10 Harvard Street, New Britain, Conn., has plans for a two-story plant, 50 x 100 ft., to manufacture special tools.

Wallace Barnes Co., Main Street, Bristol, Conn., manufacturer of steel springs, screw machine products, etc., is continuing its expansion program and has awarded general contract to Aberthaw Co., Boston, for five-story unit, 60 x 240

ft., and smaller four-story building, to cost more than \$250,000 with equipment.

Hadley Co., 297 Dexter Street, Providence, R. I., manufacturer of jewelry, plated ware, etc., has awarded general contract to A. W. Merchant, Inc., Hospital Trust Building, for two-story addition, 60 x 105 ft., to cost about \$50,000 with equipment.

Bangor Hydro-Electric Co., Bangor, Me., has plans for an addition to hydro-electric generating plant, to cost more than \$350,000 with equipment. Company recently arranged for increase in capital from \$13,000,000 to \$15,000,000.

Sikorsky Aviation Corporation, municipal airport, Lordship, Bridgeport, Conn., now building new plant for manufacture of aircraft, including parts and assembling, will soon proceed with another unit, one-story, 175 x 200 ft., to cost more than \$100,000 with equipment. Fletcher-Thompson, Inc., 542 Fairfield Avenue, is architect and engineer.

Texas Co., 31 St. James Avenue, Boston, has filed plans for two-story storage and distributing plant at East Boston, including machine and repair shop and pumping station, to cost \$80,000 with equipment. Company engineering department is in charge. Headquarters are at 17 Battery Place, New York.

L. & H. Motor Corporation, Hartford, Conn., is having plans drawn for three-story service, repair and garage building, 70 x 300 ft., to cost \$300,000 with equipment. C. J. Bennett, 36 Pearl Street, is consulting engineer.

Park Department, 33 Beacon Street, Boston, will have plans prepared for municipal airport at East Boston, including hangars, repair and reconditioning shops and other units. A fund of \$250,000 has been appropriated.

Philadelphia

PHILADELPHIA, March 18.—Bids have been asked on general contract by Edgcomb Steel Co., Eleventh and Cambria Streets, Philadelphia, for two-story storage and distributing plant unit, 156 x 250 ft., to cost about \$200,000 with equipment. Clarence E. Wunder, 1520 Locust Street, is architect.

Precision Grinding Wheel Co., 8300 Torresdale Avenue, Philadelphia, has awarded general contract to Wintz Brothers, 1618 Sellers Street, for two-story addition, 70 x 97 ft., to cost about \$50,000 with equipment.

General Electric Co., Witherspoon Building, Philadelphia, has awarded second contract to United Engineers & Constructors, Inc., 112 North Broad Street, for one-story automobile service, repair and garage building, to cost \$150,000 with equipment. Harris & Richards, Drexel Building, are architects.

H. S. Getty & Co., Inc., 1015 West Thayer Street, Philadelphia, manufacturer of hardware, has awarded general contract to Northern Construction Co., 5302 North Fifth Street, for one-story addition, to cost about \$30,000 with equipment.

Philadelphia & Reading Coal & Iron Co., Philadelphia, has selected property at Herndon on Susquehanna River, as site for steam-operated electric power plant, to be equipped to use pulverized fuel, to cost about \$5,000,000 with transmission system. Station will be used for central generating service for group of new electrically-operated coal breakers at dif-

ferent points in anthracite coal district, referred to in these columns last week.

Brown Instrument Co., Roberts and Wayne Avenues, Philadelphia, manufacturer of pyrometers and other measuring instruments, is having plans drawn for addition, to cost more than \$50,000 with equipment. Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

Karl F. Otto, 1828 Arch Street, Philadelphia, architect, has plans for a two-story automobile service, repair and garage building, to cost \$110,000 with equipment.

Central Airport, Inc., C. Townsend Ludington, chairman, head of Ludington Philadelphia Flying Service, Atlantic Boulevard, Philadelphia, has awarded contract to Airport Development & Construction Co., Philadelphia, for six hangars, with repair and reconditioning shops, etc., for capacity of 44 airplanes, at Camden, N. J., airport, where 190-acre tract was recently acquired. Project will cost more than \$250,000 with equipment.

Board of School Control, 425 Washington Avenue, Scranton, Pa., is asking bids on general contract until March 25, for four-story addition to technical high school, to cost \$500,000 with equipment. Albert J. Ward, Scranton Lackawanna Office Building, is architect; Tudor Williams, Scranton Life Building, is supervising engineer.

Lycoming Mfg. Co., Williamsport, Pa., manufacturer of automobile engines, a subsidiary of Auburn Automobile Co., Auburn, Ind., has superstructure under way on one-story addition, 80 x 1350 ft., for production of aircraft motors, including parts and assembling departments, to cost \$450,000 with machinery.

Arthur Farmer and Joseph Johnson, 123 Cumberland Street, Lebanon, Pa., have organized Johnson-Farmer Chain Co., with capital of \$50,000, and plan operation of local plant to manufacture iron and steel chains and kindred products.

Chicago

CHICAGO, March 18.—Purchases of machine tools are increasing. In outlying parts of the Central West single machine orders are still the rule, but in and near Chicago industrial plants are again buying for expansion. A sizable list has been bought by a radio equipment manufacturer, and an electrical parts maker has taken a number of machine tools. A liberal purchase has been made by an office supply company and a can manufacturer has closed for a number of machines.

Tractor builders are buying and also asking for prices. Allis-Chalmers Mfg. Co., Milwaukee, has purchased special machinery for light tractor production. There is promise of future business from automobile manufacturers. The railroads are quiet except for an inquiry for four 36-in. shapers by the Burlington. The Illinois Steel Co., has ordered a Quickwork shear and another steel company is said to be preparing a list.

Peoples Gas, Light & Coke Co., 122 South Michigan Avenue, Chicago, will build a gas holder to cost \$700,000. R. Schenck, 122 South Michigan Avenue, is architect.

Plans have been filed by Grigsby-Grunow Co., 5801 Dickens Avenue, Chicago, manufacturer of radio equipment, for two-story addition, 185 x 231 ft., to cost

The Crane Market

INQUIRY for electric overhead cranes is increasing and there are still some sizable lists of cranes to be awarded. The Baldwin Locomotive Works is reported to have closed with three makers on 14 cranes for the new steel castings plant at Eddystone, Pa., and the Chase Brass & Copper Co., Waterbury, Conn., has placed six 5 and 10-ton cranes with a Middle Western builder. The Chesapeake & Ohio Railroad still has an inquiry for 21 overhead cranes and the Nichol Copper Co., Laurel Hill, Long Island, has not yet placed its list of five 12½-ton cranes. The Inland Steel Co., Chicago, is expected to enter the market for a number of cranes for steel mill additions. The National Electric Products Corporation, Elizabeth, N. J., is about to close on two 5 or 10-ton, 85-ft. span cranes. The locomotive crane field is moderately active. The Erie Railroad is inquiring for a 150-ton wrecking crane.

Among recent purchases are:

Chase Brass & Copper Co., Waterbury, Conn., six 5 and 10-ton overhead cranes from Middle Western builder.

Port of New York Authority, 75 West Street, New York, 10-ton, 17-ft. span, 1-motor overhead crane from Box Crane & Hoist Corporation.

Glens Falls Portland Cement Co., Glens Falls, N. Y., 5-ton, 22-ft. 6-in. span hand power crane from Box Crane & Hoist Corporation.

Baldwin Locomotive Works, 14 overhead cranes for new plant of General Steel Castings Co., Eddystone, Pa.; five 75-ton reported purchased from Alliance Machine Co.; four 40-ton reported from Shaw Electric Crane Co. and four 25-ton and one 10-ton gantry reported from Shepard-Niles Crane & Hoist Corporation.

Pittsburgh Screw & Bolt Co., 5-ton, 51-ft. span crane from Alliance Machine Co.

Stone & Webster, Inc., Boston, 10-ton crane for an El Paso, Tex., power plant from Shepard-Niles Crane & Hoist Corporation.

F. C. Foltz & Co., Chicago, 6-ton, gasoline operated crawler type crane from Orton Crane & Shovel Co.

Miller Iron & Metal Co., Chicago, 12-ton, gasoline operated crawler type crane from Orton Crane & Shovel Co.

Pacific Car & Foundry Co., Seattle, Wash., 10-ton overhead traveling crane from Shaw Electric Crane Co.

Mount Vernon Car Co., Mount Vernon, Ill., six overhead electric cranes, ranging in capacity from 5 to 30 tons each, from Shaw Electric Crane Co.

about \$300,000 with equipment. M. C. Schwab, 30 North Michigan Avenue, is architect.

Thorne Motors Corporation, care of Foltz & Co., 510 North Dearborn Street, Chicago, architects, recently organized, has purchased tract of 33,000 sq. ft. in Clearing industrial district as site for one-story plant to manufacture gasoline-electric vehicles. Plant will have 21,000 sq. ft. floor space, and is reported to cost about \$70,000 with equipment.

Rogers Brothers, Inc., North Water Street, Batavia, Ill., is completing plans for one-story metal galvanizing plant at Blue Island, Ill., to cost about \$55,000 with equipment. J. B. Seaverns is company engineer; A. P. Rogers is president.

Northern Pacific Railway Co., St. Paul, Minn., is said to be planning extensions and improvements in locomotive repair shops at Livingston, Mont., to cost \$30,000.

Krone-Sebek Die Casting & Mfg. Co., West Forty-seventh Street and Richmond Avenue, Chicago, will more than triple its capacity in connection with removal to location noted, occupying former factory of Fell Mfg. Co., consisting of one and two-story structure, 100 x 300 ft. Former plant at 664 West Austin Avenue will be discontinued.

City Council, Duluth, Minn., is having plans drawn for municipal airport, to include hangar, repair and reconditioning shop and other units, to cost \$75,000. John Wilson, City Hall, is city engineer, in charge.

Western Electric Co., Forty-eighth Avenue and West Twenty-second Street, Chicago, has leased three-story factory at Homan Avenue and Pontiac Street, totaling about 90,000 sq. ft. floor space, for expansion.

American Key Can Co., 140 South Dearborn Street, Chicago, manufacturer of wire can keys, has leased space in building at 121 West Pershing Road, totaling 9000 sq. ft., for expansion and will remove to new location.

Barnard & Leas Mfg. Co., Moline, Ill., has plans for new foundry as part of improvement program to be completed within next few months at cost of \$100,000.

South Atlantic

BALTIMORE, March 18.—Public Improvement Commission, Municipal Office Building, Baltimore, has plans for one and two-story additions to Polytechnic Institute, North and Guilford Avenues, to cost about \$1,000,000 with equipment. Charles M. Anderson, 9 East Pleasant Street, is architect; Henry Adams, Calvert Building, is mechanical engineer.

Berliner-Joyce Aircraft Corporation, recently formed by Henry Berliner, head of Berliner Aircraft Co., Alexandria, Va., has awarded general contract to M. A. Long Co., 10 West Chase Street, Baltimore, for initial units of airplane plant at municipal airport, Baltimore, one story, to cost about \$250,000 with machinery. Company has opened local offices in Hearst Tower Building, Baltimore. W. W. Moss is president.

W. T. Kirk, Belhaven, N. C., and associates, have organized Kirk Boat Mfg. Co., with capital of \$100,000, and plan operation of boat-building and repair works.

Glenn L. Martin Co., Leland and Ponca Streets, Baltimore, manufacturer of aircraft, now operating temporary plant, has purchased tract of about two square miles on Middle River, about 10 miles from city, near municipal airport, and will break ground before close of month for initial units of new plant, to cost over \$1,000,000 with machinery. Philip L. Small & Associates, Terminal Tower Building, Cleveland, are architects and engineers.

City Council, Cambridge, Md., is completing plans for municipal airport, including hangars, repair shops, oil storage and other units, to cost more than \$75,000 with equipment.

B. F. Goodrich Co., Akron, Ohio, manufacturer of tires and other rubber products, has acquired 15-acre tract at Atlanta, Ga., as site for new mill, for which plans will be drawn at once, to cost about

\$1,500,000 with machinery. Company is said to be arranging fund of about \$4,000,000 for this development and expansion in other plants.

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Decker Screw Products Co., Albion, Mich., is having plans drawn for a new one-story plant, to cost about \$40,000 with equipment.

Shaw-Walker Co., Muskegon, Mich., manufacturer of metal desks and other furniture, has awarded general contract to O. F. Miller Co., Pratt Building, for five-story addition, to cost about \$160,000 with equipment. Billingham & Cobb, 120 Woodward Avenue, Kalamazoo, Mich., are architects.

Albion Metal Products Co., Albion, Mich., manufacturer of spray guns, windshield screens, etc., is reported planning one-story addition, to cost over \$30,000 with equipment.

City Council, Birmingham, Mich., is considering establishment of municipal airport, including hangars, repair shop and other units, to cost about \$75,000 with equipment.

St. Louis

ST. LOUIS, March 18.—Acme Pipe & Metal Co., 1527 Walnut Street, Kansas City, Mo., Harry B. Strauss, in charge, is said to be considering one-story steel fabricating plant in Northeast industrial district, to cost more than \$80,000 with equipment.

Missouri Pacific Railroad Co., St. Louis, has awarded general contract to Ganger-Korsmo Construction Co., Memphis, Tenn., for addition to engine house and new repair shops at Poplar Bluff, Mo., to cost about \$150,000 with equipment. Company is said to be considering plans for further expansion in this vicinity, including terminal facilities, to cost over \$250,000.

Independence Stove & Furnace Co., 700 South Cottage Street, Independence, Mo., has awarded general contract to L. W. Weeks, 633 South Fuller Street, for one-story addition, 65 x 120 ft., to be used primarily for enameling, to cost more than \$50,000 with equipment.

Refinery Supply Co., 3406 Main Street, Dallas, Tex., manufacturer of technical and scientific instruments for oil and gas industries, will erect two-story plant at Tulsa, Okla., 25 x 100 ft., to cost about \$35,000, and will remove to that location. William G. Schleuter is president.

Nicholas-Beazley Airplane Co., Inc., Marshall, Mo., has plans for one-story addition to aircraft plant, 50 x 150 ft., to cost about \$60,000 with equipment.

Sterling Machinery Corporation, 2307 Holmes Street, Kansas City, Mo., has filed plans for one-story addition, 25 x 90 ft., for assembling. A 3-ton traveling crane and other mechanical handling equipment will be installed.

Stearman Aircraft Co., 601 East Thirty-fifth Street, Wichita, Kan., has awarded general contract to Hemrlon Improvement Co., Schweiter Building, for one-story and basement foundry addition, 55 x 125 ft., to cost about \$30,000 with equipment.

Board of Education, Lincoln, Neb., has plans for equipment storage and distributing plant, 135 x 200 ft., with repair shop, wood-working shop, testing laboratory and other departments, to cost \$170,000 with machinery. Ellery Davis, 525 South Thirteenth Street, is architect.

Alleghany Tube & Steel Co., 1308 North Main Street, St. Louis, manufacturer of pipe couplings, nipples and plugs, has been incorporated. Company occupies 40,000 sq. ft. of floor space, and is planning for 25,000 sq. ft. additional. About \$25,000 will be invested in new equipment. L. A. Crancer is president.

Liquid Carbonic Co., 1813 Olive Street, St. Louis, will erect new two-story and basement liquid carbonic gas plant, 100 x 150 ft. When completed, present structure will be replaced by new building, 50 x 100 ft. About \$300,000 will be invested in plant and equipment.

Milwaukee

MILWAUKEE, March 18.—Despite the fact that most tool builders are farther behind on deliveries now than at any time since the present buying movement began, new business is being offered in good volume. Buyers appear to have become accustomed to delays, and are anticipating their needs at greater distances ahead than ever before. The used tool stocks have been combed until there is little left that is deemed suitable even to meet the most pressing needs.

Aluminum Goods Mfg. Co., Fifteenth and Franklin Streets, Manitowoc, Wis., expects to be ready about April 1 for bids on a three and five-story addition, 100 x 170 ft., to plating shop of main works in Manitowoc. Work is in charge of W. Fred Dolke, consulting engineer, 9 South Clinton Street, Chicago. Estimated cost of building alone is \$125,000.

American Lace Paper Co., 908 Juneau Avenue, Milwaukee, has accepted bid of Paul Riesen's Sons, 1018 Humboldt Avenue, for general contract on four-story plant, 82 x 320 ft., to cost about \$250,000. Richard Philipp, 405 Broadway, is architect.

Wisconsin Grey Iron Foundry Co., West Milwaukee, has placed contracts for a shop addition and alterations in present plant at Thirty-ninth Avenue and Burnham Street.

F. J. Stepnoski, architect, Fond du Lac, Wis., is making plans for a machine and welding shop for Walter Manowske & Co., 139 Dix Street.

Badger Zinc Co., Platteville, Wis., is about to start work on erection of a zinc mill costing about \$35,000 at Linden, Wis.

Indiana

INDIANAPOLIS, March 18.—Contract has been let by Steinite Radio Co., Atchison, Kan., Lester S. Abelson, general manager, to Buesching-Hagerman & Co., 402 East Superior Street, Fort Wayne, for new plant at Bueter Road and New Haven Avenue, comprising four one-story units, 200 x 550 ft., for cabinet manufacture, assembling, spray department, etc.; 200 x 500 ft., for machine division, including main assembling and condenser departments; 45 x 50 ft., for boiler plant; and 25 x 50 ft., for storage and distributing service, to cost \$400,000 with equipment. Larimore & Parkinson, Tri-State Bank Building, Fort Wayne, are supervising architects.

Nusbaum Novelty Co., 107 West Main Street, Berne, manufacturer of toys, etc., plans early call for bids for rebuilding part of plant recently destroyed by fire.

Board of School Commissioners, 150 North Meridian Street, Indianapolis, Albert F. Walsman, business director, is asking bids until March 26 for steel lockers, locker room benches, knock-down bleachers and other equipment for Arsenal technical high school.

Capehart Automatic Phonograph Co., 124 East Franklin Street, Fort Wayne, is having plans drawn for one-story plant, to cost about \$55,000 including equipment. C. W. Weatherhogg, 250 West Wayne Street, is architect.

Harry E. Boyle & Co., Furniture Building, Evansville, architects, have plans for a six-story automobile service, repair and garage building, 100 x 225 ft., to cost about \$150,000 with equipment.

Gulf States

BIRMINGHAM, March 18.—A 220-acre tract at South San Antonio has been acquired by Grayburg Oil Co., San Antonio, Tex., as site for new oil refinery for which plans will be drawn at once. It is estimated to cost about \$1,000,000 with equipment. Present refinery will be removed to new location.

Burkhead Mfg. Co., 1920 Harrington Street, Houston, Tex., manufacturer of sheet metal products, has awarded general contract to J. R. Braffett, Houston, for one-story addition, 85 x 380 ft., to cost about \$40,000 with equipment.

Marland Production Co., operated by Marland Refining Co., Ponca City, Okla., is planning for construction of pipe line from oil fields in western part of Texas to Shreveport, La., to cost more than \$700,000 with booster stations, etc. Company recently acquired property of Louisiana Oil & Refining Co., including refinery at Shreveport, and new pipe line will be used for crude oil supply to latter plant.

Ratliff Sheet Metal Works, Gadsden, Ala., has plans for two-story addition, 30 x 100 ft., to cost about \$27,000 with equipment. Samuel Ratliff is head.

Southwest Utilities Corporation, Big Spring, Tex., operating electric light and power, natural gas and other utility properties, is disposing of a bond issue of \$1,400,000, part of proceeds to be used for extensions and improvements. Floyd W. Woodcock is president.

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City Pattern Works, Inc., Harper Avenue and Rivard Street, Detroit, manufacturer of metal and wood patterns, is considering one and two-story addition, to cost about \$45,000 with equipment.

Decker Screw Products Co., Albion, Mich., is having plans drawn for a new one-story plant, to cost about \$40,000 with equipment.

Shaw-Walker Co., Muskegon, Mich., manufacturer of metal desks and other furniture, has awarded general contract to O. F. Miller Co., Pratt Building, for five-story addition, to cost about \$160,000 with equipment. Billingham & Cobb, 120 Woodward Avenue, Kalamazoo, Mich., are architects.

Albion Metal Products Co., Albion, Mich., manufacturer of spray guns, wind-shield screens, etc., is reporting planning one-story addition, to cost over \$30,000 with equipment.

City Council, Birmingham, Mich., is considering establishment of municipal airport, including hangars, repair shop and other units, to cost about \$75,000 with equipment.

St. Louis

ST. LOUIS, March 18.—Acme Pipe & Metal Co., 1527 Walnut Street, Kansas City, Mo., Harry B. Strauss, in charge, is said to be considering one-story steel fabricating plant in Northeast industrial district, to cost more than \$80,000 with equipment.

Missouri Pacific Railroad Co., St. Louis, has awarded general contract to Ganger-Korsmo Construction Co., Memphis, Tenn., for addition to engine house and new repair shops at Poplar Bluff, Mo., to cost about \$150,000 with equipment. Company is said to be considering plans for further expansion in this vicinity, including terminal facilities, to cost over \$250,000.

Independence Stove & Furnace Co., 700 South Cottage Street, Independence, Mo., has awarded general contract to L. W. Weeks, 633 South Fuller Street, for one-story addition, 65 x 120 ft., to be used primarily for enameling, to cost more than \$50,000 with equipment.

Refinery Supply Co., 3406 Main Street, Dallas, Tex., manufacturer of technical and scientific instruments for oil and gas industries, will erect two-story plant at Tulsa, Okla., 25 x 100 ft., to cost about \$35,000, and will remove to that location. William G. Schleuter is president.

Nicholas-Beazley Airplane Co., Inc., Marshall, Mo., has plans for one-story addition to aircraft plant, 50 x 150 ft., to cost about \$60,000 with equipment.

Sterling Machinery Corporation, 2307 Holmes Street, Kansas City, Mo., has filed plans for one-story addition, 25 x 90 ft., for assembling. A 3-ton traveling crane and other mechanical handling equipment will be installed.

Stearman Aircraft Co., 601 East Thirty-fifth Street, Wichita, Kan., has awarded general contract to Hemmion Improvement Co., Schweiter Building, for one-story and basement foundry addition, 55 x 125 ft., to cost about \$30,000 with equipment.

Board of Education, Lincoln, Neb., has plans for equipment storage and distributing plant, 135 x 200 ft., with repair shop, wood-working shop, testing laboratory and other departments, to cost \$170,000 with machinery. Ellery Davis, 525 South Thirteenth Street, is architect.

Alleghany Tube & Steel Co., 1308 North Main Street, St. Louis, manufacturer of pipe couplings, nipples and plugs, has been incorporated. Company occupies 40,000 sq. ft. of floor space, and is planning for 25,000 sq. ft. additional. About \$25,000 will be invested in new equipment. L. A. Crancer is president.

Liquid Carbonic Co., 1813 Olive Street, St. Louis, will erect new two-story and basement liquid carbonic gas plant, 100 x 150 ft. When completed, present structure will be replaced by new building, 50 x 100 ft. About \$300,000 will be invested in plant and equipment.

Milwaukee

MILWAUKEE, March 18.—Despite the fact that most tool builders are farther behind on deliveries now than at any time since the present buying movement began, new business is being offered in good volume. Buyers appear to have become accustomed to delays, and are anticipating their needs at greater distances ahead than ever before. The used tool stocks have been combed until there is little left that is deemed suitable even to meet the most pressing needs.

Aluminum Goods Mfg. Co., Fifteenth and Franklin Streets, Manitowoc, Wis., expects to be ready about April 1 for bids on a three and five-story addition, 100 x 170 ft., to plating shop of main works in Manitowoc. Work is in charge of W. Fred Dolke, consulting engineer, 9 South Clinton Street, Chicago. Estimated cost of building alone is \$125,000.

American Lace Paper Co., 908 Juneau Avenue, Milwaukee, has accepted bid of Paul Riesen's Sons, 1018 Humboldt Avenue, for general contract on four-story plant, 82 x 320 ft., to cost about \$250,000. Richard Philipp, 405 Broadway, is architect.

Wisconsin Grey Iron Foundry Co., West Milwaukee, has placed contracts for a shop addition and alterations in present plant at Thirty-ninth Avenue and Burnham Street.

F. J. Stepnoski, architect, Fond du Lac, Wis., is making plans for a machine and welding shop for Walter Manowske & Co., 139 Dix Street.

Badger Zinc Co., Platteville, Wis., is about to start work on erection of a zinc mill costing about \$35,000 at Linden, Wis.

Indiana

INDIANAPOLIS, March 18.—Contract has been let by Steinite Radio Co., Atchison, Kan., Lester S. Abelson, general manager, to Buesching-Hagerman & Co., 402 East Superior Street, Fort Wayne, for new plant at Bueter Road and New Haven Avenue, comprising four one-story units, 200 x 550 ft., for cabinet manufacture, assembling, spray department, etc.; 200 x 500 ft., for machine division, including main assembling and condenser departments; 45 x 50 ft., for boiler plant; and 25 x 50 ft., for storage and distributing service, to cost \$400,000 with equipment. Larimore & Parkinson, Tri-State Bank Building, Fort Wayne, are supervising architects.

Nusbaum Novelty Co., 107 West Main Street, Berne, manufacturer of toys, etc., plans early call for bids for rebuilding part of plant recently destroyed by fire.

Board of School Commissioners, 150 North Meridian Street, Indianapolis, Albert F. Walsman, business director, is asking bids until March 26 for steel lockers, locker room benches, knock-down bleachers and other equipment for Arsenal technical high school.

Capehart Automatic Phonograph Co., 124 East Franklin Street, Fort Wayne, is having plans drawn for one-story plant, to cost about \$55,000 including equipment. C. W. Weatherhogg, 250 West Wayne Street, is architect.

Harry E. Boyle & Co., Furniture Building, Evansville, architects, have plans for a six-story automobile service, repair and garage building, 100 x 225 ft., to cost about \$150,000 with equipment.

Gulf States

BIRMINGHAM, March 18.—A 280 acre tract at South San Antonio has been acquired by Grayburg Oil Co., San Antonio, Tex., as site for new oil refinery for which plans will be drawn at once. It is estimated to cost about \$1,000,000 with equipment. Present refinery will be removed to new location.

Burkhead Mfg. Co., 1920 Harrington Street, Houston, Tex., manufacturer of sheet metal products, has awarded general contract to J. R. Braffett, Houston, for one-story addition, 85 x 380 ft., to cost about \$40,000 with equipment.

Marland Production Co., operated by Marland Refining Co., Ponca City, Okla., is planning for construction of pipe line from oil fields in western part of Texas to Shreveport, La., to cost more than \$700,000 with booster stations, etc. Company recently acquired property of Louisiana Oil & Refining Co., including refinery at Shreveport, and new pipe line will be used for crude oil supply to latter plant.

Ratliff Sheet Metal Works, Gadsden, Ala., has plans for two-story addition, 30 x 100 ft., to cost about \$27,000 with equipment. Samuel Ratliff is head.

Southwest Utilities Corporation, Big Spring, Tex., operating electric light and power, natural gas and other utility properties, is disposing of a bond issue of \$1,400,000, part of proceeds to be used for extensions and improvements. Floyd W. Woodcock is president.

Crane Co., 836 South Michigan Avenue, Chicago, has purchased property at Jack-

sonville, Fla., and plans construction of new factory branch and distributing plant, to cost about \$100,000 with equipment.

El Paso Electric Co., El Paso, Tex., has selected 70 acre tract near city limits, and plans construction of new steam-operated electric generating station, with initial capacity of 55,000 kw., to cost \$4,500,000 with transmission lines. Company is subsidiary of Engineers Public Service Co., which is operated by Stone & Webster Engineering Co., Boston, and it is understood that plans will be drawn at office of latter organization.

Chicago Mill & Lumber Co., 111 West Washington Street, Chicago, has plans for new wood pulp mill and insulating board manufacturing plant at Greenville, Miss., with main unit, 140 x 540 ft., to cost over \$1,250,000 with machinery. Completion is scheduled in August. Walter P. Paepcke is president.

Columbus Gravel Co., Columbus, Tex., is planning extensions and improvements in sand and gravel plant, including construction of new all-steel mechanical washing plant, to cost more than \$75,000 with equipment.

City Council, Austin, Tex., Adam R. Johnson, city manager, is considering extensions and improvements in municipal electric light and power plant, including installation of additional equipment, to cost about \$400,000.

Pacific Coast

SAN FRANCISCO, March 14.—Plans have been completed by Moreland Aircraft Co., Los Angeles, for one-story plant, 120 x 180 ft., at Inglewood, to include parts and assembling departments, to cost more than \$75,000 with equipment. Austin Co. of California, Inc., 777 East Washington Street, is architect and engineer.

Terminal Cold Storage Co., 763 East McKinley Street, Phoenix, Ariz., has plans for a six-story cold storage and refrigerating plant, to cost about \$500,000 with equipment. H. D. Frankfurt, Securities Building, is architect.

Slag Paving Brick & Products Co., Globe, Ariz., has plans for new electrically-operated slag brick-manufacturing plant, to cost \$200,000 with machinery. Lloyd LeRaine Pike, Homebuilders' Building, Phoenix, Ariz., is architect.

Ray Mfg. Co., 118 New Montgomery Street, San Francisco, manufacturer of oil burners, etc., has plans for expansion and improvements for increased output.

Lahe Spring Co., 167 Hayes Street, San Francisco, manufacturer of steel automobile springs, has awarded general contract to Industrial Construction Co., 815 Bryant Street, for one-story plant, to cost about \$35,000 with equipment.

Portland Electric Power Co., Electric Building, Portland, is having plans drawn for two-story equipment storage and distributing plant at Salem, Ore., with repair department, to cost \$40,000 with equipment.

Western Steel & Foundry Co., recently organized, will take over and expand plant and property of Western Steel Co., Midvale, Utah. Additional equipment will be installed.

Crown Willamette Paper Co., 248 Battery Street, San Francisco, is said to have plans for expansion and improvements at mill at Camas, Wash., including new units for production of bleached sulphite pulp and finished paper and new paper converting mill, to cost about \$2,500,000 with equipment.

Foreign

CONTRACT has been made by Soviet Russian Government, Moscow, with Nitrogen Engineering Corporation, 331 Madison Avenue, New York, for engineering work and supervision in construction of nitrogen plant for production of synthetic ammonia fertilizers, to cost \$10,000,000 with equipment. It is proposed to build other such units following completion of first plant. Amtorg Trading Corporation, 165 Broadway, New York, is official buying agency for Soviet Russian Union.

Kolster-Brandes, Ltd., London, recently organized as British subsidiary of Kolster Radio Corporation, 200 Mount Pleasant Avenue, Newark, has acquired a plant adjoining present factory at Sidcup, England, with land for further expansion. New unit will be equipped for production of portable radio sets, as well as combined radio and electric phonograph, similar to that manufactured by parent company for Columbia Phonograph Co., Inc., New York.

Swedish Chamber of Commerce of United States, 25 Beaver Street, New York, has received an inquiry (Reference 37) from a company in Sweden desiring to purchase American-made machinery for production of corrugated paper boxes.

Following recent acquisition of controlling interest in Opel Co., manufacturer of four-cylinder automobiles, with plant at Russelsheim, near Frankfurt, Germany, General Motors Corporation, Detroit, is said to be planning discontinuance of production at plant at Borsigwalde, near Berlin, Germany, and will concentrate manufacture, including parts and assembling, at Opel works, primarily for Chevrolet six-cylinder cars. Production of Opel automobile will also be continued. Present plant has rating of 500 automobiles and 5000 bicycles per day.

South Manchuria Railway Co., Mukden, Manchuria, has an expansion and improvement program under way at Iron works at Anshan, including new blast furnace. Plans are being considered for construction of a steel mill to utilize large part of output of furnaces for production of steel products as required by railroad. Entire project is reported to cost more than \$1,000,000.

Saugbruksforeningen, Halen, Norway, is planning an expansion and improvement program at paper mill, including new paper-making unit and auxiliary equipment, and installation of new machinery in bleached sulphite pulp division.

Manila Machinery & Supply Co., Inc., Manila, P. I., has been appointed representative in the Philippine Islands for the Roller-Smith Co., 233 Broadway, New York, maker of electrical measuring instruments, relays and circuit breakers.

Canada

TORONTO, March 18.—Machine tool sales continue in good volume with inquiries indicating a stronger demand in early spring. Single tool business is a feature in current transactions, with lists calling for a half-dozen tools being closed from time to time. Specifications are out for equipment for several new plants and dealers and builders report a large volume of business in sight. The demand

covers many lines of both iron and wood-working tools.

Further additions to wire plant of Canadian Steel Corporation, Ojibway, Ont., are expected to be made soon. Extensions will include purchase of equipment for manufacture of electric weld, reinforcing fabric, chain link industrial fencing, gates and posts.

Chrysler Corporation, Walkerville, Ont., is preparing to build another unit early this year in connection with its \$3,000,000 plant program. First unit is nearing completion and machinery is being installed.

Canadian Goodrich Co., Kitchener, Ont., has plans for a four-story factory, and will purchase equipment to cost \$100,000.

Horwood & White, 229 Yonge Street, Toronto, architects, are preparing plans for a two-story factory for Standard Radio Corporation, to cost \$250,000.

Atlantic Gypsum Co., Ltd., subsidiary of Canada Cement Co., Ltd., Montreal, has plans for an addition to its plant at Cheticamp, N. S., and construction of a pier, to cost, including equipment, \$600,000. Construction work will start in summer.

Brantford Roofing Co., Sydenham Street, Brantford, Ont., is considering erection of a factory, 40 x 105 ft., to cost \$40,000.

Ross & MacDonald, 1 Belmont Street, Montreal, are preparing plans for a three-story and basement addition, 70 x 120 ft., to plant of Simmons, Ltd., 400 St. Ambroise Street.

Ross & MacDonald, 1 Belmont Street, Montreal, are preparing plans for a plant for Canadian Elevator Equipment Co., 94 Sherbourne Street, Toronto.

J. L. Havill, 169 Concord Avenue, Toronto, will call for bids in April for a six-story factory, 75 x 136 ft., for F. J. Hartz Co., 24 Hayter Street.

New Trade Publications

Oxwelding Pressure Vessels.—Linde Air Products Co., New York. Discusses design, construction, and testing of large leak-proof vessels for heavy pressures. Also workshop methods and training of workmen.

Zinc and Its Alloys.—New Jersey Zinc Co., 160 Front Street, New York. A 28-page booklet dated January, 1929, gives chemical analyses and physical properties of some of the leading products of this company. There are also included methods of analyses and specifications, as well as other interesting data.

Nickel Alloy Steel.—International Nickel Co., New York. A 14-page leaflet entitled "Buyers' Guide, Nickel Alloy Steel Products," gives a complete list of the manufacturers of most of the alloy steel products containing nickel. The data are given in alphabetical order by products and the leaflet is dated Jan. 1, 1929.

Industrial Steel Mesh.—Consolidated Expanded Metal Companies, Wheeling, W. Va. Handbook of industrial mesh and its numerous applications. There are 54 pages, with a four-page insert dealing with partition bars and accessories for framing the industrial mesh. The handbook gives many details showing numerous uses of the mesh, not only for partitions, but for machinery guards, railings, skylight guards, sides of industrial trucks, lockers, dipping baskets, etc.

